1970 REVISIONS TO
1969 STANDARD DRAWING BOOK FOR
ROAD & BRIDGE CONSTRUCTION

STATE HIGHWAY COMMISSION
HELENA, MONTANA 59601

January 1, 1970

STANDARD DRAWING BOOK

We are sending the following additions and/or revisions effective January 1, 1970, to be included in your present Standard Drawing Book, the grey covered one, original issue January 1, 1969.

11-04	Roadway Embankment at Bridge Ends.
39-14	Standard Concrete Approach Slabs to Structures.
39-15	Standard Concrete Approach Slabs to Structures With U Type Abutments.
50-01	Culvert Riprap.
54-03	Bedding Material.
56-01	Thickness for Corrugated Steel Pipe 2 2/3 x 1/2 Corrugation - H20 Loading.
56-02	Thickness for Corrugated Steel Pipe 3 x 1 Corrugation - H20 Loading.
56-03	Thickness for Corrugated Steel Pipe 3 x 1 Corrugation - H20 Loading.
56-04	Thickness for Corrugated and Structural Plate Pipes for Railroad Cooper E72 Live Load.
56-07	Flared End Terminal Section Round Corrugated Metal Pipe.
56-10	Embankment Protector.
57-01	Thickness for Corrugated Steel Pipe Arch - H20 Loading.
57-02	Flared End Terminal Section Corrugated Metal Pipe Arch Culvert.
57-03	Bevel on Corrugated Steel Pipe Arch.
59-03	Step Bevel for Circular CSP and SSP.
65-01	Thickness for Corrugated Aluminum Pipe - H20 Live Load.
69-01	Semicircular Underdrain.
80-02	Median Barrier Fence.
82-01	Cattle Guard.
88-09	Signing of Median U Turns.
88-56	Typical Road Approach Signing.
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88-59	Typical Guide Sign Placement.
88-74	X 1-1 Sign and Erection Detail.
88-92	Delineator Spacing for Horizontal Highway Curves.
90-17	Reflector Washer
90-18	Flex Beam Guard Rail Bridge Approach.
96-01	Monuments and Markers.

NOTE - (1) Add these drawings to your book.
(2) We are also sending a complete new index, pages 1 through 6. You should destroy the old index, pages 1 through 5.

Melvin C. Rygg

Melvin C. Rygg, P.E.,
Office Engineer

STATE HIGHWAY COMMISSION
HELENA, MONTANA 59601

STANDARD DRAWINGS FOR HIGHWAY CONSTRUCTION

These Standard Drawings which are supplementary to the Standard Specifications become effective January 1, 1969.

In the future when revised drawings are sent, they will become effective on the date shown thereon and the superseded drawings should be retained until no longer applicable.

New Drawings issued will become effective on the date shown thereon.

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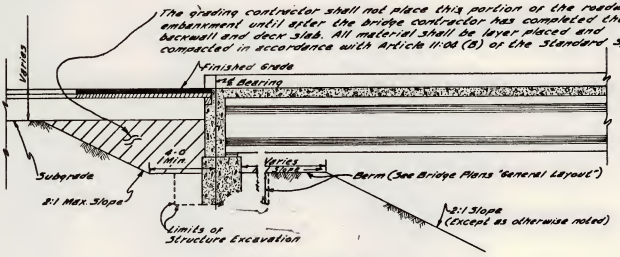
REVISED	4-16-69	6-1-69	9-23-69			STANDARD DRAWING NO. 11-04
EFFECTIVE	6-1-69	7-1-69	1-1-70			

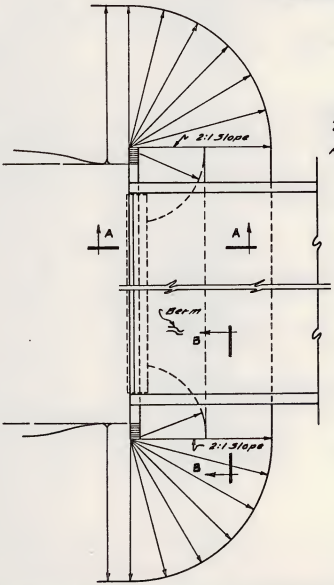
State Highway Commission
Helena, Montana

ROADWAY EMBANKMENT AT BRIDGE END

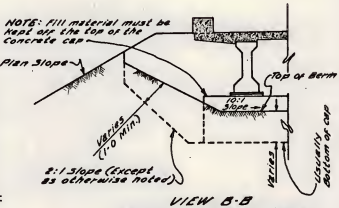
Approved
State Highway Engineer 6/21/69



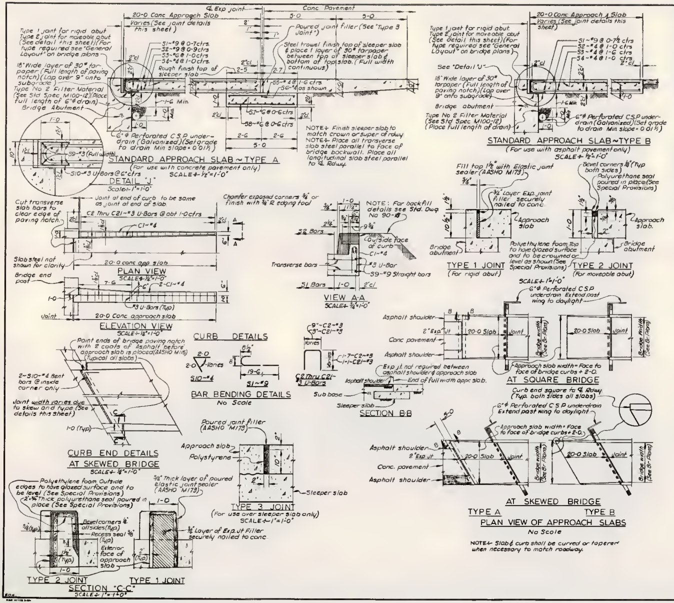
SECTION A-A



PLAN VIEW AT FINISHED BRIDGE END



VIEW B-B
AT FINISHED BRIDGE END



DRAWN 11-6-69 EFFECTIVE 1-1-70		STANDARD DRAWING NO. 39-14
STATE HIGHWAY COMMISSION HELENA, MONTANA	STANDARD CONCRETE APPROACH SLABS TO STRUCTURES	APPROVED BY: STATE HIGHWAY ENGINEER

NOTES

APPROACH SLAB: Approach slab shall be constructed in accordance with Section 41 of the Standard Specifications. The slab shall be finished as specified for bridge decks in Article 41.04(K) 2 & 3. Concrete shall be either Class AD or Class AP at contractors option.

REINFORCING STEEL: Reinforcing steel shall be in accordance with Section 47 of the Standard Specifications except method of measurement and payment shall be as set forth below.

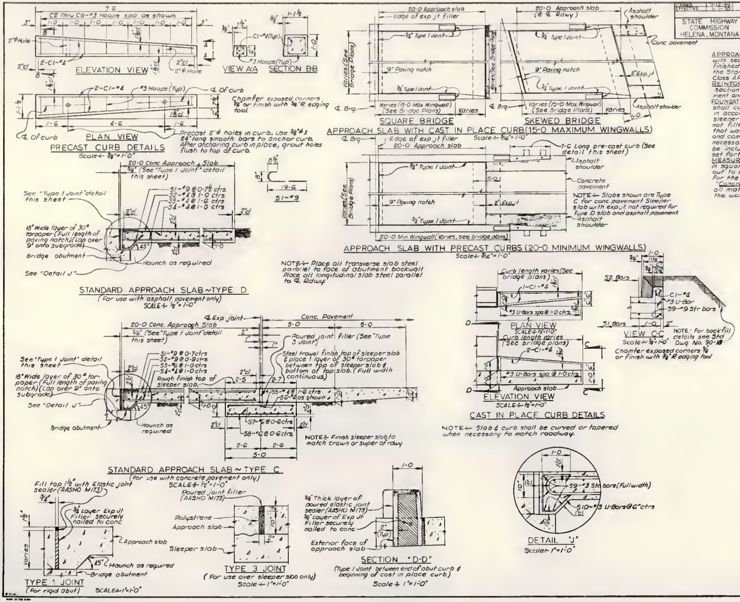
FOUNDATION: The foundation for the approach slab & sleeper slab shall consist of the subgrade and base constructed and compacted in accordance with Standard Plans and Specifications. Excavation for sleeper slab shall be held to a minimum and all area excavated but not filled with concrete shall be back-filled with the same material that was taken from the excavation. All backfill shall be layer placed and compacted with mechanical tampers. The cost of all excavation necessary for the placement of approach slab & sleeper slab shall be included in the unit price bid for "Concrete Approach Slab" as set forth below.

MEASUREMENT & PAYMENT: Approach slabs shall be measured by area in square yards. The width & length for measurement shall be from out to out of completed slab. No additional area will be allowed for the sleeper slab. The unit price bid per square yard for "Concrete Approach Slab" shall be full compensation for furnishing all materials, equipment, tools and labor necessary to complete the work, including the sleeper slab.

SEALS: For type & method of application of polyurethane seals see Special Provisions.

Large prints can be obtained from Office Engineer.

DRAWN 11-12-69 / EFFECTIVE 1-1-70		STANDARD DRAWING NO 39 15	
STATE HIGHWAY COMMISSION HELENA, MONTANA	STANDARD CONCRETE APPROACH SLABS TO STRUCTURES WITH U-TYPE ABUTMENTS	APPROVED BY: [signature] STATE HIGHWAY ENGINEER	



NOTES

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MEASUREMENT & PAYMENT : Approach slabs shall be measured by area in square yards. The width and length for measurement shall be from out to out of completed slab. No additional area will be allowed for the sleeper slab. The unit price bid per square yard for "Concrete Approach Slab" shall be full compensation for furnishing all materials, equipment, tools and labor necessary to complete the work, including the sleeper slab.

Large prints can be obtained from Office Engineer.

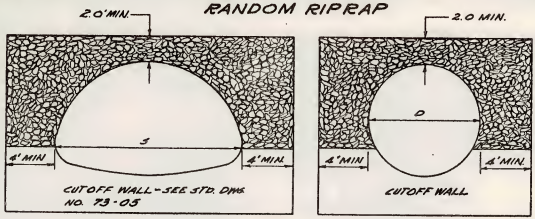
REVISED	3-1-63	11-F-68	9-12-69				STANDARD DRAWING NO. 50-01
EFFECTIVE	5-F-63	1-F-69	7-1-70				

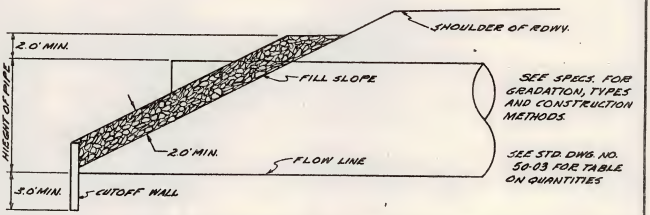
State Highway Commission
Helena, Montana

CULVERT RIPRAP

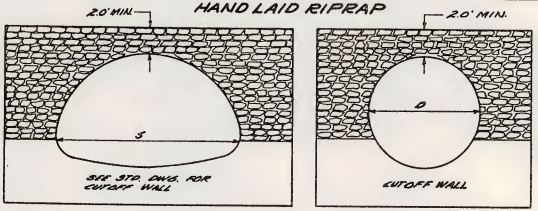
Approved
Lowell Fuller 10-29-68
State Highway Engineer

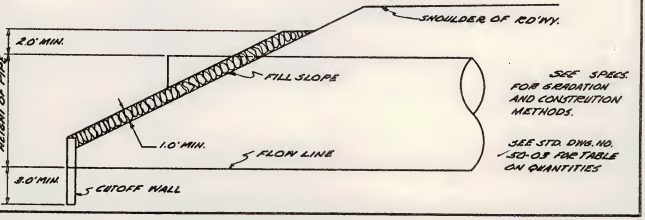
RANDOM RIPRAP





HAND LAID RIPRAP





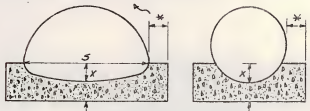
REVISED	1-1-68	11-20-68	7-15-69	STANDARD DRAWING NO. 54-03
EFFECTIVE	2-1-68	1-1-69	1-1-70	

State Highway Commission
Helena, Montana

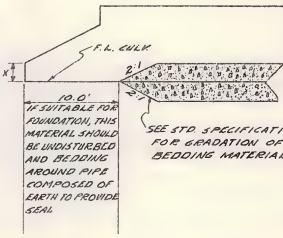
BEDDING MATERIAL

Approved
[signature]
State Highway Engineer

*AS DIRECTED WITHIN 2.0' TO 6.0' FOR PIPES GREATER THAN 60" DIAMETER OR SPAN. 2.0' FOR SMALLER PIPES.



FOR X DIST. SEE STD. DRAWINGS NO'S. 59-01 59-03 59-04 & 59-05



CIRCULAR C.S.P. & S.S.P.R.C.

DIAMETER OF PIPE (IN.)	CU. YDS. BEDDING MATL. REQD. PER LIN. FT. FOR 2.0' THICKNESS	DIAMETER OF PIPE (IN.)	CU. YDS. BEDDING MATL. REQD. PER LIN. FT. FOR 2.0' THICKNESS
60	0.94	162	2.45
66	1.02	168	2.55
72	1.09	174	2.66
78	1.16	180	2.77
84	1.25	192	2.99
90	1.33	198	3.10
96	1.41	204	3.22
102	1.50	210	3.34
108	1.58	216	3.45
114	1.67	228	3.69
120	1.76	240	3.94
126	1.85	252	4.20
132	1.93		
138	2.04		
144	2.14		
150	2.24		
156	2.34		

STRUCT. PLATE PIPE ARCH STOCK & VEHICULAR UNDERPASS

DESIGN	SPAN	RISE	CU. YDS. BEDDING MATL. REQ'D. PER L.F. (2" THICK)
99	6'11"	8'6"	1.15
129	10'10½"	9'11"	1.42
156	13'10"	11'9½"	2.29
180	15'6"	13'10"	2.53
192	16'2"	14'10"	2.42

STRUCTURAL PLATE PIPE ARCH

SPAN	RISE	CU. YDS. BEDDING MAT'L. REQ'D. PER LIN. FT. FOR 2.0" THICKNESS		
		1½:1 BEV.	2:1 BEV.	2½:1 BEV.
18" CORNER PLATES				
6'1"	4'7"	1.16	1.16	1.16
6'9"	4'11"	1.23	1.23	1.23
7'3"	5'3"	1.19	1.19	1.19
7'11"	5'7"	1.30	1.30	1.30
8'7"	5'11"	1.37	1.37	1.37
9'4"	6'3"	1.47	1.47	1.47
9'9"	6'7"	1.48	1.48	1.48
10'8"	6'11"	1.68	1.68	1.68
11'5"	7'3"	1.78	1.78	1.78
11'10"	7'7"	1.68	1.68	1.68
12'6"	7'11"	1.80	1.80	1.80
12'10"	8'4"	1.75	1.75	1.75
31" CORNER PLATES				
14'0"	9'8"	2.13	2.13	2.13
15'4"	10'4"	2.31	2.31	2.31
16'6"	11'0"	2.36	2.36	2.36
17'11"	11'8"	2.53	2.53	2.53
19'3"	12'4"	2.77	2.77	2.77
20'5"	13'0"	2.31	2.91	2.91

STRUCT. PLATE PIPE STOCKPASS

DESIGN	SPAN	RISE	CU. YDS. BEDDING MAT'L. REQ'D. PER L.F. (2" THICK)
A	5'10"	5'6"	0.99
B	5'10"	7'7"	0.99

REVISED	5-9-68	11-20-68	12-5-69			
EFFECTIVE	11-1-68	1-1-69	1-1-70	STANDARD DRAWING NO.	56-01	
State Highway Commission Helena, Montana	THICKNESS FOR CORRUGATED STEEL PIPE $2\frac{2}{3} \times \frac{1}{2}$ CORRUGATION H-20 LOADING			Approved State Highway Engineer		

THICKNESS (CIRCULAR CORRUGATED STEEL PIPE)

SEAM FABRICATION		RIVETED, WELDED OR HELICALLY FABRICATED				
AREA	DIA.	HEIGHT OF COVER (FEET)				
(SQ. FT.)	(INCHES)	0.064"	0.079"	0.109"	0.138"	0.168"
1.2	15	67	73	93	98	100
1.8	18	47	55	70	82	86
2.4	21	37	43	50	58	64
3.1	24	30	33	40	48	54
4.9	30	24	25	29	33	37
7.1	36	21	22	24	26	28
9.6	42		20	21	23	24
12.6	48		19	20	21	22
15.9	54			19	20	21
19.6	60			18	19	20
23.8	66				18	19
28.3	72				18	18
37.2	78					18
38.5	84					18

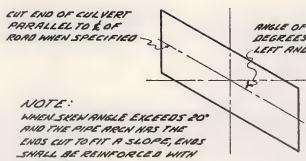
THICKNESS INCHES	GAGE (APPROX.)
0.064"	16
0.079"	14
0.109"	12
0.138"	10
0.168"	8

THICKNESS (ELONGATED CORRUGATED STEEL PIPE)

SEAM FABRICATION		RIVETED, WELDED OR HELICALLY FABRICATED				
AREA	DIA.	HEIGHT OF COVER (FEET)				
(SQ. FT.)	(INCHES)	0.064"	0.079"	0.109"	0.138"	0.168"
1.2	15	67	73	93	98	100
1.8	18	47	55	70	82	86
2.4	21	37	43	50	58	64
3.1	24	30	33	40	48	54
4.9	30	34	36	47	49	52
7.1	36	28	30	39	41	43
9.6	42		38	43	46	48
12.6	48		37	40	42	44
15.9	54			38	39	41
19.6	60			34	38	40
23.8	66				35	38
28.3	72				25	31
33.2	78					25
38.5	84					20

NOTES:
USE SPECIAL DESIGN FOR STRUCTURES WITH HEIGHTS OF COVER EXCEEDING THESE TABLES.

MINIMUM COVER 2 FT.



NOTE:
WHEN SKEW ANGLE EXCEEDS 20° AND THE PIPE ARCH HAS THE ENDS CUT TO FIT A SLOPE, ENDS SHALL BE REINFORCED WITH MASONRY.

REVISED	8-1-67	11-20-67	12-5-69	STANDARD DRAWING NO. 56-02
EFFECTIVE	8-1-67	1-1-69	1-1-70	

State Highway Commission

Helena, Montana

THICKNESS FOR CORRUGATED STEEL PIPE

3 x 1 CORRUGATION H-20 LOADING

Approved

State Highway Engineer

FILL HEIGHT OF CIRCULAR CORRUGATED STEEL PIPE

SEAM FABRICATION		SPOT WELDED				
		5/16" RIVETS OR HELICAL		3/8" RIVETS OR HELICAL FABRICATION		
AREA (SQ. FT.)	DIA. (INCHES)	HEIGHT OF COVER (FT.)		HEIGHT OF COVER (FT.)		
		0.064"	0.079"	0.109"	0.138"	0.168"
13	48	23	27	30	34	38
16	54	20	24	26	29	32
20	60	19	22	24	26	28
24	66	17	20	22	23	25
28	72	15	20	21	22	23
33	78	14	19	20	21	22
38	84		19	19	20	21
44	90		18	19	19	20
50	96			18	19	20
57	102			18	19	19
64	108			18	19	19
71	114				18	19
78	120				18	19

FILL HEIGHT FOR ELONGATED CORRUGATED STEEL PIPE

SEAM FABRICATION		SPOT WELDED				
		5/16" RIVETS OR HELICAL		3/8" RIVETS OR HELICAL		
AREA (SQ. FT.)	DIA. (INCHES)	HEIGHT OF COVER (FT.)		HEIGHT OF COVER (FT.)		
		0.064"	0.079"	0.109"	0.138"	0.168"
10						
13	48	23	34	52	54	57
16	54	20	29	47	48	50
20	60	19	26	42	43	45
24	66	17	24	38	39	41
28	72	15	22	35	36	38
33	78	14	21	32	33	35
38	84		19	30	31	32
44	90		18	28	29	30
50	96			26	27	28
57	102			25	25	26
64	108			23	24	25
71	114				22	24
78	120				21	22

"NOTES"

USE SPECIAL DESIGN FOR STRUCTURES WITH HEIGHTS OF COVER EXCEEDING THESE TABLES.

IF SKEW IS REQUIRED SEE ST'D. DWG. NO. 56-01

MINIMUM COVER - 2 FT.

REVISED	8-1-67	11-20-68	12-3-69	STANDARD DRAWING NO. 56-03
EFFECTIVE	8-1-67	1-1-67	1-1-70	

State Highway Commission
Helena, Montana

THICKNESS FOR CORRUGATED STEEL PIPE
3x1 CORRUGATION H-20 LOADING

Approved
State Highway Engineer

FILL HEIGHT FOR CIRCULAR CORRUGATED STEEL PIPE

SEAM FABRICATION		SPOT WELDED OR BOLTED(⅝" A325 Bolts)				
		⅔" Rivets		⅞" Rivets		
AREA	DIAMETER	HEIGHT OF COVER (Feet)				
Sq. Ft.	Inches	0.064"	0.079"	0.109"	0.138"	0.168"
13	48	24	27	30	34	38
16	54	22	24	26	29	32
20	60	21	22	24	26	28
24	66	20	20	22	23	25
28	72	19	20	21	22	23
33	78	18	19	20	21	22
38	84		19	19	20	21
44	90		18	19	19	20
50	96			18	19	20
57	102			18	19	19
64	108			18	19	19
71	114				18	19
78	120				18	19

FILL HEIGHT FOR ELONGATED CORRUGATED STEEL PIPE

SEAM FABRICATION		SPOT WELDED OR BOLTED(½" A325 Bolts)				
		⅔ Rivets		⅞ Rivets		
AREA	DIAMETER	HEIGHT OF COVER (Feet)				
Sq. Ft.	(In.)	0.064"	0.079"	0.109"	0.138"	0.168"
13	48	32	44	60	68	76
16	54	29	39	52	58	64
20	60	25	35	48	52	56
24	66	23	32	44	46	50
28	72	22	29	42	44	46
33	78	20	27	40	42	44
38	84		25	38	40	42
44	90		23	37	38	40
50	96			35	38	39
57	102			33	36	37
64	108			31	34	35
71	114				32	33
78	120				30	32

NOTES: Use special design for structures with Heights of cover exceeding these tables.
If skew is required see Std. Dwg. No 56-01
Minimum cover 2 Ft.

REVISED	9-21-66	1-20-68	12-10-69
EFFECTIVE	2-1-67	1-1-69	1-1-70

STANDARD DRAWING NO. 56-04

State Highway Commission
Helend, Montana

THICKNESS FOR CORRUGATED & STRUCTURAL PLATE PIPES FOR RAILROAD COOPER E 72 LIVE LOAD

Approved
State Highway Engineer

THICKNESS OF CORRUGATED METAL PIPE (ROUND OR VERTICALLY ELONGATED)

Diam. in Inches	Area in Sq. Ft	Height of Cover Above Top of Culvert — in Feet									
		1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
18	1.8	0.079	0.079	0.079	0.079	0.079	0.079	0.109	0.109	0.109	0.109
21	2.4	0.079	0.079	0.079	0.079	0.079	0.109	0.109	0.109	0.138	0.138
24	3.1	0.079	0.079	0.079	0.079	0.109	0.109	0.109	0.138	0.138	0.138
30	4.9	0.079	0.079	0.109	0.109	0.138	0.138	0.138	0.168*	0.168*	0.168*
36	7.1	0.109	0.109	0.109	0.138	0.168	0.168	0.168*	0.168*	0.168*	0.168*
42	9.6	0.109	0.109	0.138	0.168	0.168					
+ 42	9.6						0.168	0.168*	0.168*	0.168*	0.168*
+ 48	12.6	0.138	0.138	0.168	0.168	0.168	0.168	0.168*	0.168*	0.168*	0.168*
+ 54	15.9	0.168	0.168	0.168	0.168	0.168*	0.168*	0.168*	0.168*		
+ 60	19.6	0.168	0.168	0.168	0.168	0.168*					
+ 66	23.8	0.168	0.168	0.168*							
+ 72	28.3	0.168	0.168*								

* Make a trench one diameter deep in orginol soil or in compacted fill. The gages shown are the minimum structurol requirements for use with adequate backfill.
For recommended minimum height of cover, see below.
+ Values below line are based on verticol elongation of pipe.

THICKNESS OF CORRUGATED METAL PIPE-ARCHES

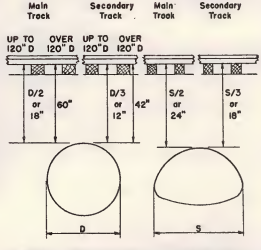
Diam. of Pipe of Equal Periph. in Inches	Span in Inches	Rise in Inches	Height of Cover — in Feet			
			2	3-4	5-7	8-15
			Recom. Minimum THKS.			
15	18	11	0.079	0.079	0.079	0.079
18	22	13	0.079	0.079	0.079	0.079
21	25	16	0.109	0.079	0.079	0.079
24	29	18	0.109	0.109	0.079	0.079
30	36	22	0.138	0.109	0.109	0.109
36	43	27	0.168	0.138	0.138	0.109
42	50	31		0.168	0.138	0.138
48	58	36			0.168	0.168
54	65	40				0.168
60	72	44				0.168

EQUIVALENT GAGE NUMBERS	
GAGE	THICKNESS
16	0.064
14	0.079
12	0.109
10	0.138
8	0.168

GAGES OF STRUCTURAL PLATE PIPE (VERTICALLY ELONGATED)

Diam. in Inches	Height of Cover — in Feet												
	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-70	71-80	81-90	91-100
60	12	12	12	12	12	12	12	12	12	12	10	10	8	7	5	5
66	12	12	12	12	12	12	12	12	12	10	10	8	8	7	5	3
72	12	12	12	12	12	12	12	12	10	10	8	8	7	5	3	1
78	10	12	12	12	12	12	12	10	10	8	8	8	5	3	1	
84	10	12	12	12	12	12	12	10	10	8	8	7	5	3	1	
90	10	12	12	12	12	12	10	10	8	8	7	5	3	1		
96	8	12	12	12	12	10	10	10	8	7	7	5	3	1		
108	8	10	10	10	10	10	10	8	7	5	5	3	1			
120	8	10	10	10	10	10	8	7	5	5	3	1				
132	8	10	10	10	10	8	8	7	5	3	1	1				
144	7	8	10	10	8	8	7	5	3	1	1					
156	7	8	8	8	8	8	5	3	1	1						
168	7	8	8	8	8	7	5	3	1							
180	7	8	8	8	8	5	3	1								

Use speciol design for structures with height of cover exceeding this table.



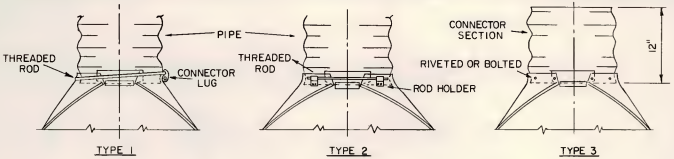
Minimum height of cover for corrugoted metol structures under Cooper E 50 to E 72 railrood loodings, for moin ond secondory tracks.

REVISED	1-1-64	1-30-69	6-1-69	12-8-69	
EFFECTIVE	1-1-64	1-1-69	7-1-69	1-1-70	STANDARD DRAWING NO. 56-07

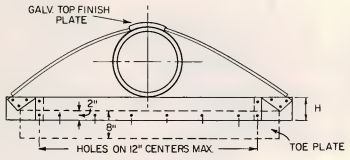
State Highway Commission
Helena, Montana

FLARED END TERMINAL SECTION ROUND CORRUGATED METAL PIPE

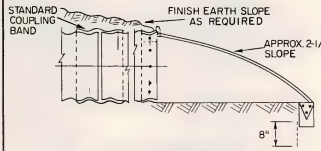
Approved
Chief Engineer 12-9-68
State Highway Engineer



TYPE 1 TYPE 2 TYPE 3

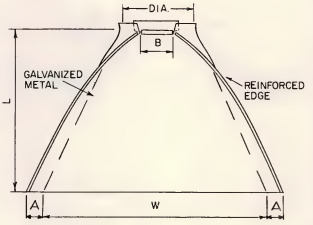


ELEVATION



TYPICAL CROSS-SECTION

(ILLUSTRATED WITH TYPE 3 CONNECTION)



PLAN

PIPE DIAM	MIN. THICK-NESS	DIMENSIONS A 1" Tol	B Max.	H 1" Tol	L 1½" Tol	W 2" Tol	Type Connector
12"	0.064	6	6"	6"	21"	24"	1,3
15"	0.064	7	8	6	26	30	1,3
18"	0.064	8	10	6	31	36	1,3
21"	0.064	9	12	6	36	42	1,3
24"	0.064	10	13	6	41	48	1,3
30"	0.079	12	16	8	51	60	3,4
36"	0.079	14	19	9	60	72	3,4
42"	0.109	16	22	11	69	84	3,4
48"	0.109	18	27	12	78	90	3,4

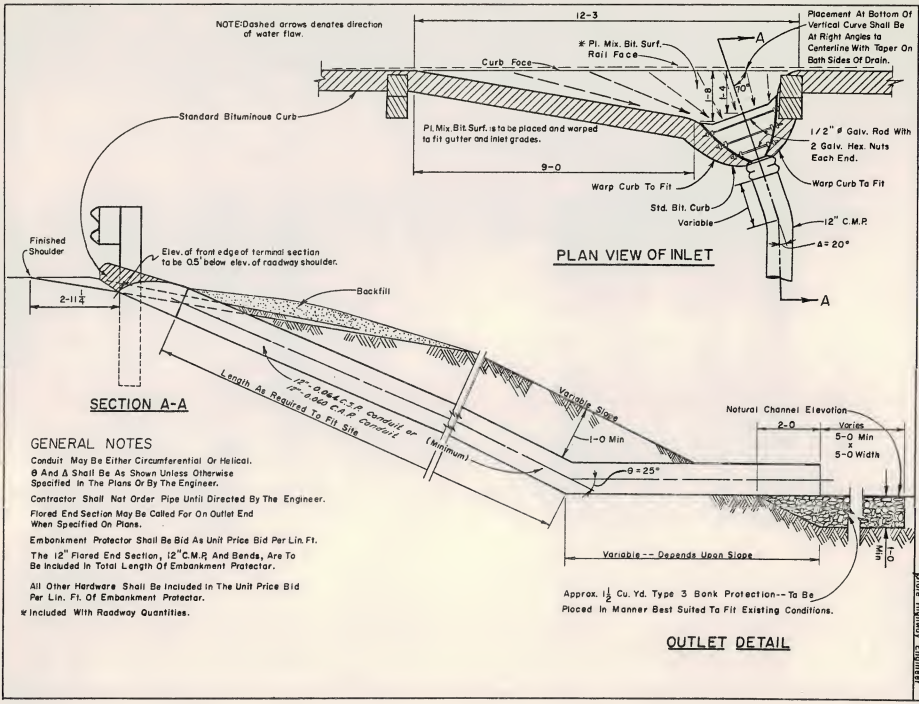
Flared end terminal section to be included in length of pipe shown on plans.

All parts are to be galvanized in accordance with AASHO M 36.

Any areas where galvanizing is broken or metal is bare shall be painted with one coat of red lead or zinc chromate prime and two coats of aluminum paint.

Minor variations in design may be acceptable on approval of the engineer. Seams or joints lengthwise of the apron will be acceptable if securely bolted, welded and painted as provided above.

The metal thickness shall be the same as the pipe to which the section is fastened.



GENERAL NOTES

Conduit May Be Either Circumferential Or Helical.

θ And Δ Shall Be As Shown Unless Otherwise Specified In The Plans Or By The Engineer.

Contractor Shall Not Order Pipe Until Directed By The Engineer.

Flared End Section May Be Called For On Outlet End When Specified On Plans.

Embankment Protector Shall Be Bid As Unit Price Bid Per Lin. Ft.

The 12" Flared End Section, 12"C.M.P. And Bands, Are To Be Included In Total Length Of Embankment Protector.

All Other Hardware Shall Be Included In The Unit Price Bid Per Lin. Ft. Of Embankment Protector.

* Included With Roadway Quantities.

Revised	9-1-68	11-1-68	1-2-69	12-8-69	12-1-70

State Highway Commission
Helena, Montana

EMBANKMENT PROTECTOR

Standard Drawing No. 56-10

Approved
Standard Highway Engineer

REVISED	6-1-62	11-20-68	12-8-69
EFFECTIVE	8-1-62	1-1-67	1-1-70

STANDARD DRAW NO. 57 - 01

State Highway Commission
Helena, Montana

THICKNESS FOR CORRUGATED STEEL PIPE ARCH
H-20 LOADING

Approved
Louis J. Bollin
State Highway Engineer

THICKNESS – CORRUGATED STEEL PIPE ARCH
2⅔"x½" CORRUGATION RIVET, WELD OR HELICALLY FABRICATED

AREA (Sq. Ft.)	SPAN (In.)	RISE (In.)	DIA. OF PIPE OF EQ. PER	MINIMUM THICKNESS	LAYOUT DIM. B (In.)	MAXIMUM COVER (Ft.)	MINIMUM COVER (Ft.)
11	18	11	15	0.064	4½	13	2
16	22	13	18	0.064	4¾	12	2
22	25	16	21	0.064	5¼	10	2
28	29	18	24	0.064	5½	9	2
44	36	22	30	0.064	6¾	9	2
64	43	27	36	0.064	7	7	2
87	50	31	42	0.079	8	7	2
114	58	36	48	0.109	9¼	7	2
143	65	40	54	0.109	10½	7	2
176	72	44	60	0.138	11½	7	2
213	79	49	66	0.168	13½	7	2
253	85	54	72	0.168	14½	7	2

NOTE: Use special design for structures with heights of cover exceeding these tables.

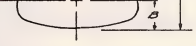
EQUIVALENT GAGE NUMBERS	
GAGE	THICKNESS
16	0.064
14	0.079
12	0.109
10	0.138
8	0.168

THICKNESS-CORRUGATED STEEL PIPE ARCH
3"x1" CORRUGATION RIVET, WELD OR HELICALLY FABRICATED

AREA (Sq. Ft.)	SPAN (In.)	RISE (In.)	DIA. OF PIPE OF EQ. PER.	MINIMUM THICKNESS	LAYOUT DIM. B (In.)	MAXIMUM COVER (Ft.)	MINIMUM COVER (Ft.)
114	58	36	48	0.064	13	12	2
143	65	40	54	0.064	14¼	12	2
176	72	44	60	0.064	16½	12	2
22	73	55	66	0.064	21	15	2
26	81	59	72	0.079	21½	15	2
31	87	63	78	0.079	22	14	2
35	95	67	84	0.109	22½	12	2
40	103	71	90	0.109	23	11	2.5
46	112	75	96	0.109	23¾	10	2.5
52	117	79	102	0.109	24	10	2.5
58	128	83	108	0.138	24½	10	2.5

NOTES: Use special design for structures with heights of cover exceeding these tables. If skew is required see Std. Dwg 149. 60-02

PIPE-ARCH SHAPE



NOTE: See Std Dwg # 73-08 if cutoff wall is required.

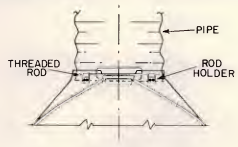
REVISED	1-1-66	1-30-67	6-1-69	12-8-69
EFFECTIVE	1-1-66	1-1-67	7-1-69	1-1-70

STANDARD DRAWING NO. 57-02

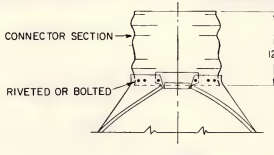
State Highway Commission
Helena, Montana

FLARED END TERMINAL SECTION
CORR METAL PIPE — ARCH CULVERT

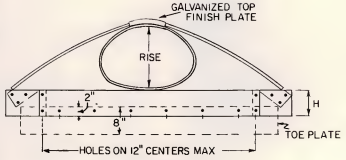
Approved
for State Highway Engineer 12-9-68



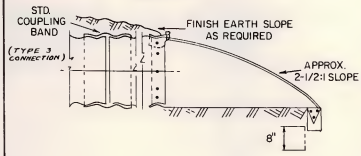
TYPE #2

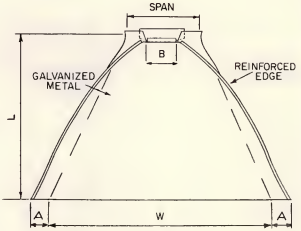


TYPE #3



ELEVATION





PLAN

PIPE-ARCH DIMENSION		MIN. THICK-NESS	DIMENSIONS					
SPAN	RISE		A 1" Tol	B Max.	H 1" Tol	L 1½" Tol	W 2" Tol.	*
18	11	0.064	7	9"	6"	19"	30"	1,2,3
22	13	0.064	7	10	6	23	36	1,2,3
25	16	0.064	8	12	6	28	42	1,2,3
29	18	0.064	9	14	6	32	48	1,2,3
36	22	0.079	10	16	6	39	60	1,2,3
43	27	0.079	12	18	8	46	75	1,2,3
50	31	0.109	13	21	9	53	85	1,2,3
58	36	0.109	18	26	12	63	90	3
65	40	0.109	18	30	12	70	102	3
72	44	0.109	18	33	12	77	114	3
79	49	0.109	18	36	12	77	126	3
85	54	0.109	18	36	12	77	138	3

Flared end terminal section to be included in length of pipe shown on plans.

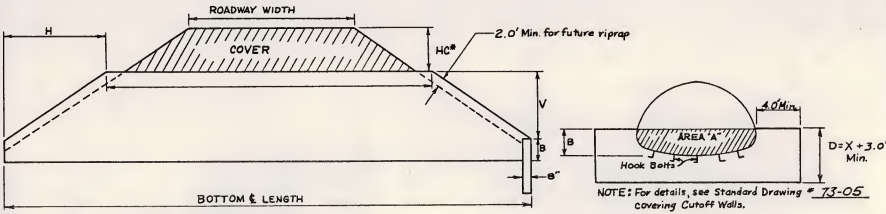
All parts are to be galvanized in accordance with AASHO M 36.

Any areas where galvanizing is broken or metal is bare shall be painted with one coat of red lead or zinc chromate prime and two coats of aluminum paint.

***Type connector — See STD. DWG. #56-07 for type 1 connector.**

Minor variations in design may be acceptable on approval of the engineer. Seams or joints lengthwise of the apron will be acceptable if securely bolted, welded and painted as provided above.

The metal thicknesses shall be the same as the pipe to which the section is fastened.



NOTE: For details, see Standard Drawing # 73-05 covering Cutoff Walls.

SPAN (Inches)	RISE (Inches)	EQUIV. (D/2)	H for Bevels of 1:2:1	2:1	V	B	Area "A"
3 by 1 inch Corrugation							
58	36	48	34½	46	23	13	4.4
65	40	54	37⅞	50½	25¼	14¾	5.6
72	44	60	41⅜	55½	27¾	16¼	6.7
73	55	66	51	68	34	21	8.7
81	59	72	56¼	75	37½	21½	10.0
87	63	78	61½	82	41	22	10.9
95	67	84	66¾	89	44½	22½	12.1
103	71	90	72	96	48	23	13.5
112	75	96	77¼	103	51½	23½	15.0
117	79	102	82½	110	55	24	16.1
128	83	108	87¾	117	58½	24½	18.2
2⅔-by ½ inch Corrugation							
58	36	48	40⅛	53½	26¾	9¼	3.1
65	40	54	44¼	59	29½	10½	3.9
72	44	60	48⅜	64½	32¼	11¾	5.0
79	49	66	53⅝	71½	35¾	13¼	6.1
85	54	72	59¼	79	39½	14½	7.3

Tolerance of ±4% will be allowed in all dimensions.

Use skew ends when skew is greater than 15° but not greater than 45°.

*HC = See Std. Dwg. No. 57-01

HC measured vertically from finished low shoulder to top of pipe. If possible, it is desirable that top of pipe be placed a min. of 1.0' below subgrade surface.

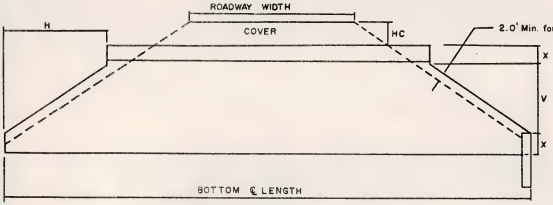
REVISED EFFECTIVE 8-1-67 | 4-1-68 | 12-30-68 | 12-1-69 | 1-1-70

State Highway Commission
Helena, Montana

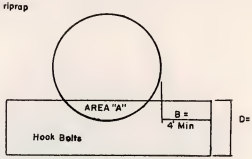
BEVEL ON CORRUGATED STEEL PIPE ARCH

STANDARD DRAWING NO. 57-03

Approved
State Highway Engineer



NOTE: See applicable Standard Drawing of Thickness Tables for Maximum & Minimum Height of Cover.



NOTE: For details, see Standard Drawing covering Cutoff Walls

Dia. (In)	X* (Ft)	H in feet for bevels of: 1.5:1	2:1	V* (Ft)	Area "A" Sq. Ft.
48	1.000	3.000	4.000	2.000	2.46
54	1.125	3.375	4.500	2.250	3.11
60	1.250	3.750	5.000	2.500	3.83
66	1.375	4.125	5.500	2.750	4.44
72	1.500	4.500	6.000	3.000	5.53
78	1.625	4.875	6.500	3.250	6.61
84	1.750	5.250	7.000	3.500	7.51
90	1.875	5.625	7.500	3.750	8.61
96	2.000	6.000	8.000	4.000	9.81
102	2.125	6.375	8.500	4.250	11.08
108	2.250	6.750	9.000	4.500	12.42
114	2.375	7.125	9.500	4.750	13.84
120	2.500	7.500	10.000	5.000	15.38
126	2.625	7.875	10.500	5.250	16.98
132	2.750	8.250	11.000	5.500	18.50

Dia. (In)	X* (Ft.)	H in feet for bevels of: 1.5:1	2:1	V* (Ft.)	Area "A" Sq. Ft.
138	2.875	8.625	11.500	5.750	20.30
144	3.000	9.000	12.000	6.000	22.10
150	3.125	9.375	12.500	6.250	24.00
156	3.250	9.750	13.000	6.500	25.9
162	3.375	10.125	13.500	6.750	27.9
168	3.500	10.500	14.000	7.000	30.1
174	3.625	10.875	14.500	7.250	32.2
180	3.750	11.250	15.000	7.500	34.5
192	4.000	12.000	16.000	8.000	39.3
198	4.125	12.375	16.500	8.250	41.7
204	4.250	12.750	17.000	8.500	44.2
210	4.375	13.125	17.500	8.750	46.9
216	4.500	13.500	18.000	9.000	49.7
228	4.750	14.250	19.000	9.500	55.5
240	5.000	15.000	20.000	10.000	61.5
252	5.250	15.750	21.000	10.500	67.7

Tolerance of ± 4% will be allowed in all dimensions.
Use skew ends when skew is greater than 15° but not greater than 45°
*For elliptical pipe, increase vertical dimensions by percent of ellipse.

APPROVED
6-16-67
6-16-67
State Highway Commission
Helena, Montana
11-20-68
1-1-70
12-8-69
1-1-70

STEP BEVEL FOR CIRCULAR CSP & SSP

STANDARD DRAWING NO. 59-03

Approved
State Highway Engineer

REVISED	2-1-68	11-20-68	12-3-69	STANDARD DRAWING NO. 65-01
REVISED	2-1-68	1-1-69	1-1-70	

State Highway Commission
Helena, Montana

THICKNESS FOR CORRUGATED ALUMINUM PIPE H-20 LIVE LOAD

Approved
State Highway Engineer 12-3-68

THICKNESS (NOT ELONGATED CORRUGATED ALUMINUM PIPE CULVERTS)

Area Sq. Ft.	Dia. Inches	Height of Cover Above Top of Culvert (Feet) 1-10	11-15	16-20	21-25	26-30	31-35	36-40
1.2	15	0.060	0.060	0.060	0.060	0.060	0.075	0.105
1.8	18	0.060	0.060	0.060	0.060	0.075	0.105	
2.4	21	0.060	0.060	0.060	0.075	0.105	0.135	
3.1	24	0.075	0.075	0.075	0.075	0.105	0.135	
4.9	30	0.075	0.075	0.075	0.105	0.135	0.164	
7.1	36	0.105	0.105	0.105	0.135	0.164		
9.6	42	0.105	0.105	0.135	0.164	0.164		

For Lengthening Culverts in Place

USE ELONGATED PIPE

Thickness Inches	Gage (Approx.)
0.060	16
0.075	14
0.105	12
0.135	10
0.164	8

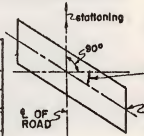
THICKNESS (ELONGATED CORRUGATED ALUMINUM PIPE CULVERTS)

Area Sq. Ft.	Dia. Inches	Height of Cover Above Top of Culvert (Feet) 1-10	11-15	16-20	21-25	26-30
12.6	48	0.105	0.105	0.105	0.135	0.164
15.9	54	0.105	0.105	0.105	0.135	0.164
19.6	60	0.135	0.135	0.164	0.164	
23.8	66	0.135	0.135	0.164		
28.3	72	0.135	0.135	0.164		

THICKNESS (CORRUGATED ALUMINUM PIPE-ARCH CULVERTS)

Area Sq. Ft.	Span Inches	Rise Inches	Dia. of Pipe of Eq. Per.	Height of Cover (Feet) 2-9	9-12	12-16
1.1	18	11	15	0.060	0.060	0.060
1.6	22	13	18	0.060	0.060	0.060
2.2	25	16	21	0.060	0.060	0.060
2.8	29	18	24	0.075	0.075	0.075
4.4	36	22	30	0.075	0.105	0.105
6.4	43	27	36	0.105	0.105	0.105
8.7	50	31	42	0.105	0.105	0.135
11.4	58	36	48	0.105	0.135	0.135
14.3	65	40	54	0.105	0.135	0.164
17.6	72	44	60	0.135	0.164	—

Note: All dimensions are in inches, except fill height.



NOTE: SKEW RIGHT SHOWN.

ANGLE OF SKEW DEGREES TO LEFT AND RIGHT.

CUT END OF CULVERT PARALLEL TO ℄ OF ROAD WHEN SPECIFIED.

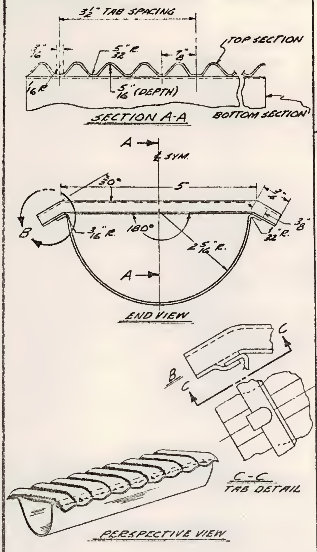
NOTE: WHEN SKEW ANGLE EXCEEDS 20° AND THE PIPE ARCH HAS THE ENDS CUT TO FIT A SLOPE, ENDS SHALL BE REINFORCED WITH MASONRY.

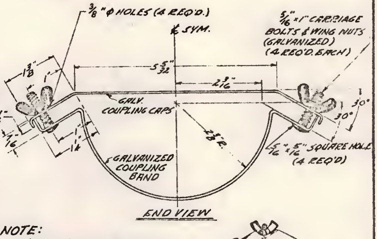
REVISED	8-1-63	11-20-68	5-21-69	12-8-69	STANDARD DRAWING NO. 69-01
EFFECTIVE	8-1-63	1-1-69	7-1-69	1-1-70	

State Highway Commission
Helena, Montana

SEMICIRCULAR UNDERDRAIN

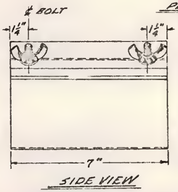
Approved [signature] 12-9-68
State Highway Engineer





NOTE:
Dimensions may vary according to the commercial availability of the product.

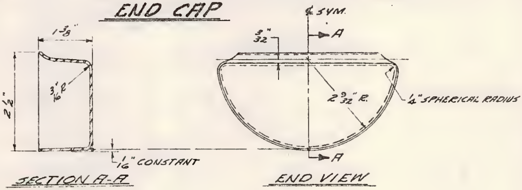
PERSPECTIVE VIEW



NOTES: ALL MAT'L SHALL BE 0.052".
SUBDRAIN PIPE SECTIONS SHALL CONFORM TO A.A.S.H.O. M-136-65
GALVANIZING OF NUTS, BOLTS, END SCREEN, END CAP AND OTHER LIKE PARTS SHALL CONFORM TO A.S.T.M. A 153

COUPLING BAND DETAILS

END CAP



PERSPECTIVE

NOTES:
MATERIAL TO BE 18 GAGE COPPER BEARING GALVANIZED STEEL.
END OF CAP TO FIT SNUG, WHEN INSERTED INSIDE END OF UNDERDRAIN.
TOLERANCES ARE ±1/16" EXCEPT AS SHOWN.
1/2" GALV. MESH SCREEN, SHAPED LIKE THE CAP, TO BE PROVIDED FOR EACH PIPE OUTLET.

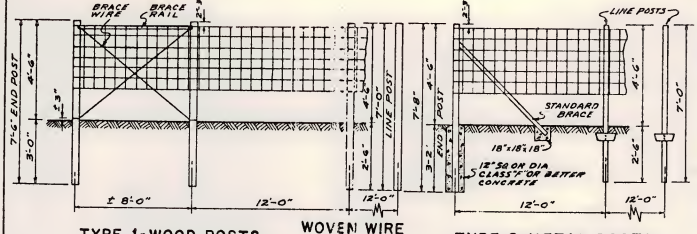
REVISED	5-1-63	11-1-68	11-1-69
EFFECTIVE	5-1-63	1-1-69	1-1-70

STANDARD DRAWING NO. **80-02**

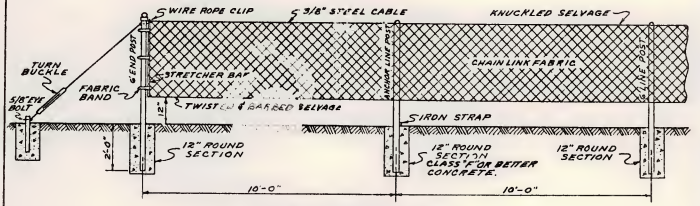
State Highway Commission
Helena, Montana

MEDIAN BARRIER FENCE

Approved
[signature] 10-24-68
State Highway Engineer



TYPE 1-WOOD POSTS — WOVEN WIRE — TYPE 2-METAL POSTS



TYPE 3-CHAIN LINK

WOVEN WIRE MEDIAN BARRIER FENCE

WOVEN WIRE - PART (B) - ARTICLE M-210.02
BRACE WIRE - PART (D) - ARTICLE M-210.02
WOOD POSTS - PART (I) - ARTICLE M-210.02
METAL POSTS- PART (H) - ARTICLE M-210.02
DEADMAN --- PART (K) - ARTICLE M-210.02
CONCRETE MATERIALS TO CONFORM TO STD SPEC.
CONSTRUCTION IN ACCORDANCE WITH STD SPEC.

METAL POST SPACING SAME AS WOOD.
SET END POST IN CONCRETE
METAL LINE POSTS TO HAVE STANDARD ANCHOR PLATE
END POSTS TO BE ANGLE STEEL 2½"x2½"x¼"

CHAIN LINK MEDIAN BARRIER FENCE

WHEN CHAIN LINK MEDIAN BARRIER FENCE IS SPECIFIED:
REFER TO STANDARD SPECIFICATIONS, FOR
MATERIALS AND CONSTRUCTION
CHAIN LINK FABRIC TO BE GALVANIZED STEEL
TOP RAIL OR CABLE SHALL NOT BE USED.
TOP AND BOTTOM OF WIRE MESH SHALL BE KNUCKLED SELVAGE.

GENERAL NOTES

MAXIMUM SPACING BETWEEN PANELS AND/OR PULL POSTS SHALL BE APPROXIMATELY 400 FEET ON TYPES 1, 2 AND 3 MEDIAN BARRIER FENCE (LESS IF DIRECTED BY ENGINEER OR SO SPECIFIED).

SEE STANDARD DRAWING NO. 81-01 FOR OTHER DETAILS AND FOR DEADMAN.

REVISED	10-5-66	11-22-68	12-5-69	
EFFECTIVE	2-1-67	1-1-69	1-1-70	

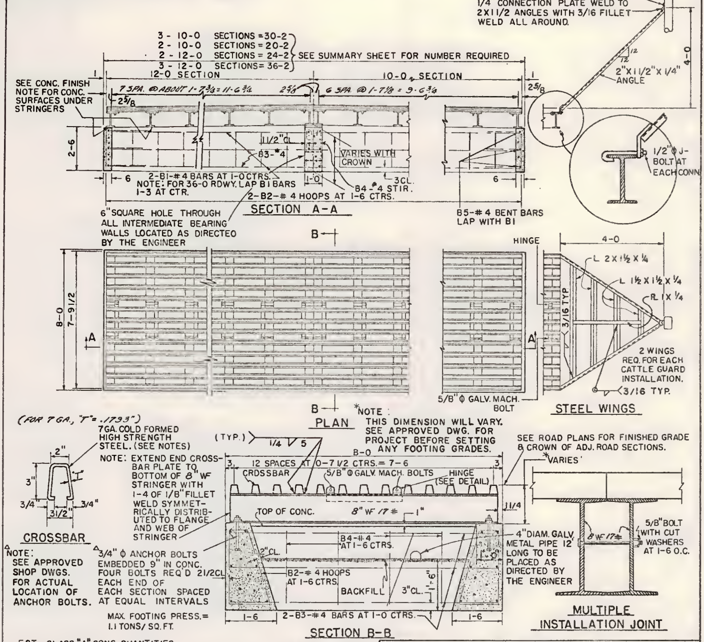
STANDARD DRAWING NO. 82-01

State Highway Commission
Helena, Montana

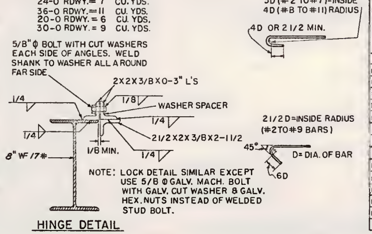
CATTLE GUARD

Approved
[illegible signature] 10-24-68
State Highway Engineer

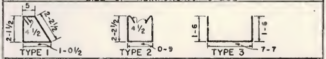
LIVE LOADING: STANDARD (H20) LOADING



EST. CLASS "A" CONC. QUANTITIES
24-0 RDWY. = 7 CU. YDS.
36-0 RDWY. = 11 CU. YDS.
20-0 RDWY. = 6 CU. YDS.
30-0 RDWY. = 9 CU. YDS.



BILL OF REINFORCING STEEL



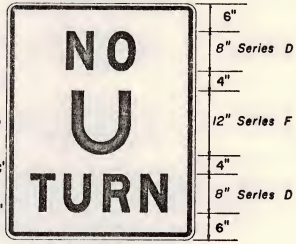
20' RDWY.					30' RDWY.									
MK	SIZE	NO.	TYPE	LENGTH	MK	SIZE	NO.	TYPE	LENGTH	MK	SIZE	NO.	TYPE	LENGTH
B1	4	12	STR.	19-10	B1	4	12	STR.	29-10					
B2	4	28	1	6-6	B2	4	42	1	6-6					
B3	4	6	STR.	7-7	B3	4	12	STR.	7-7					
B4	4	4	2	5-11	B4	4	8	2	5-11					
B5	4	6	3	10-7	B5	4	6	3	10-7					
EST. WT. = 369 LBS.					EST. WT. = 556 LBS.									
24' RDWY.					36' RDWY									
B1	4	12	STR.	23-10	B1	4	24	STR.	18-7					
B2	4	34	1	6-6	B2	4	50	1	6-6					
B3	4	6	STR.	7-7	B3	4	12	STR.	7-7					
B4	4	4	2	5-11	B4	4	8	2	5-11					
B5	4	6	3	10-7	B5	4	6	3	10-7					
EST. WT. = 427 LBS.					EST. WT. = 650 LBS.									

Drawn 3-1-66	Revised 11-1-68 12-28-69				STANDARD DRAWING NO. 88-09
State Highway Commission Helena, Montana	Effective 1-1-69 1-1-70	SIGNING OF MEDIAN U-TURNS			Approved State Highway Engineer

R3-10
36 x 48

Margin = 3/8"
Border = 7/8"
Corner Radius = 2"

R3-4 (OPTIONAL)
36 x 48

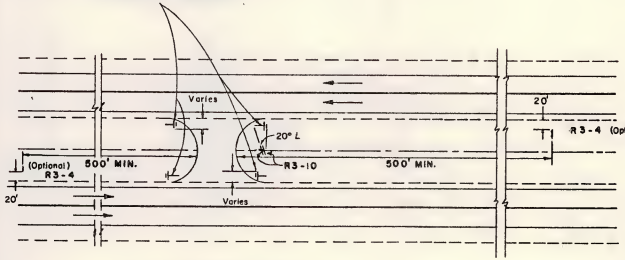


Note:

R3-4 and R3-10 Shall have black legend on White reflectorized background.

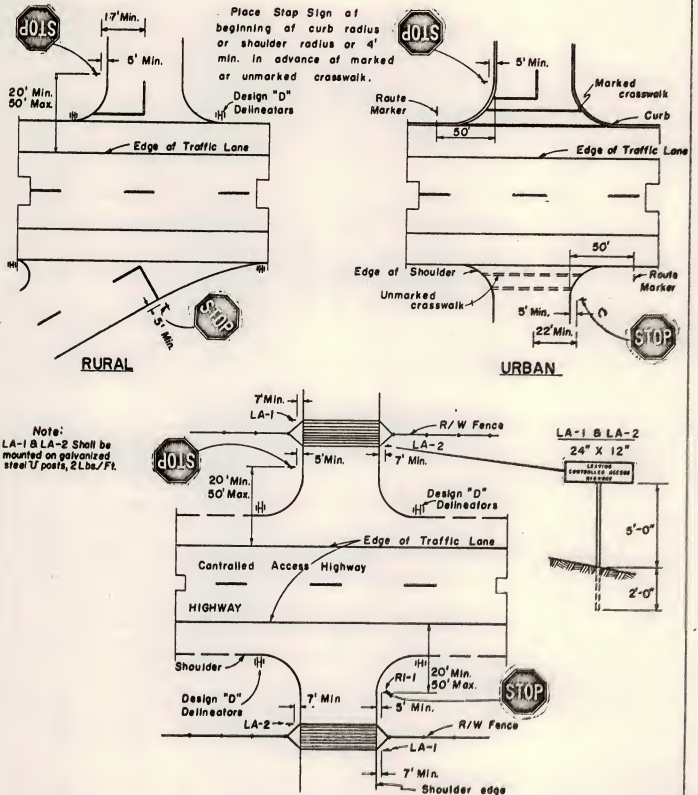
For median widths of 68 feet or less, R3-10 Signs shall be mounted back to back. They shall be placed at the centerline of the median and on the side of the U-turn away from the nearest interchange. Median widths greater than 68 feet will require seperate installations on either side of the U-turn at specified clearance. For openings through median guard rails, the sign post shall be placed in line with guard rail post.

Design 'B' delineator as specified in Standard Drawing No. 88-91



U-TURN MEDIAN OPENINGS
(See Std. Dwg. 20-05)

Drawn 6-1-65	Revised 1-1-68 11-22-69 / Effective 2-1-68 1-1-70	STANDARD DRAWING NO. 88-56
State Highway Commission, Helena, Montana	TYPICAL APPROACH ROAD SIGNING	Approved: State Highway Engineer



DRAWN 8-1-67	Revised 1-1-68	11-28-69				STANDARD DRAWING NO. 88-58
EFFECTIVE 6-1-67	Effective 2-1-68	1-1-70				
State Highway Commission Helena, Montana	TYPICAL CROSSROAD & RAMP LAYOUT					Approved James W. Calter 11-15-67 State Highway Engineer

R5-4
36" X 24"

WRONG WAY

5"
5" Series F
4"
5" Series F
5"

5/8" Morgin
2" Corner Radius

White legend on red reflectorized background

R3-2
24 x 30

NO LEFT TURN

R5-4
36 x 24

WRONG WAY

R5-1
36 x 36

DO NOT ENTER

R1-2*
36 x 36 x 36

YIELD

R1-1
48 X 48

STOP

100'

ENTERING CONTROLLED ACCESS HIGHWAY

LA-1

ROUTE MARKER

R6-1

LA-2

±330

GUIDE SIGN

±300

W3-1
48 X 48

STOP AHEAD

G-3
8'-0" x 5'-0"

EXIT

GUIDE SIGN

GUIDE SIGN

X1-1
When not protected by guardrail

R5-4
36 x 24

WRONG WAY

5' CLEARANCE

5' CLEARANCE

GUIDE SIGN

R5-1
36 x 36

DO NOT ENTER

R5-4
36 x 24

WRONG WAY

R6-1

ROUTE MARKER

LA-2

LA-1

100'

R1-1
48X48

STOP

NO LEFT TURN

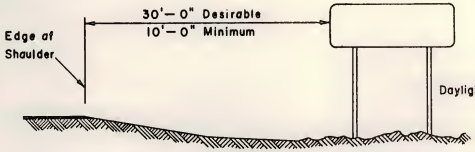
R3-2
24 x 30

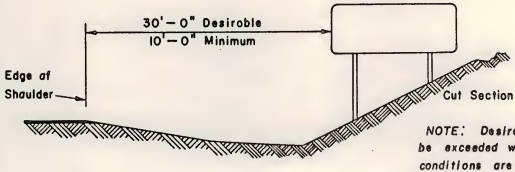
NO TURNS

R3-3
36 x 36

* NOTE:
Yield sign shall be used where acceleration lane is inadequate.

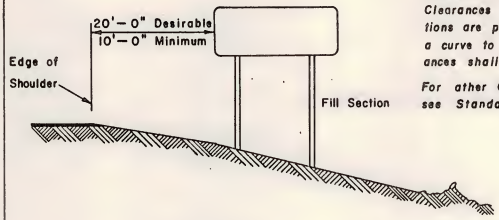
Dated 11-68 / Effective 7-1-69	Revised 11-1-68 / Effective 1-1-69	7-9-69 / -/-/70	STANDARD DRAWING NO. 88-59
State Highway Commission, Helena, Montana	TYPICAL GUIDE SIGN PLACEMENT		Approved: State Highway Engineer

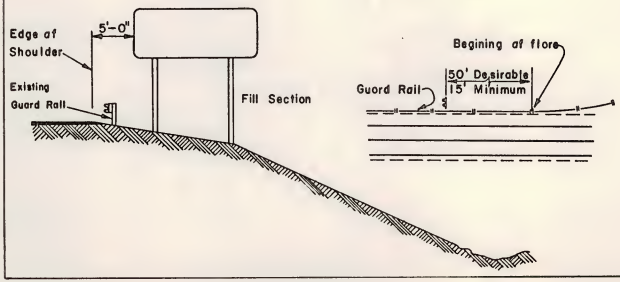




NOTE: Desirable clearances may be exceeded when terrain and viewing conditions are favorable, such as, placement on a curve to the left. Clearances may be reduced when conditions are poor, such as, placement on a curve to the right. Maximum clearances shall be 45'-0".

For other Guide Sign specifications see Standard Drawing No. 88-67.

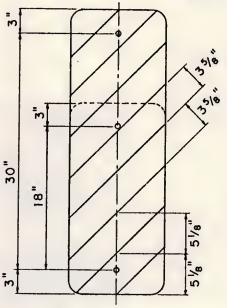




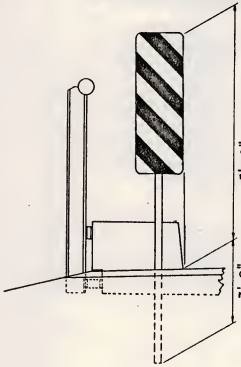
Drawn 3-1-63	REVISED 3-1-66 11-28-69 EFFECTIVE 3-1-66 1-1-70	STANDARD DRAWING NO. 88-74
State Highway Commission Helena, Montana	X1-1 SIGN & ERECTION DETAIL	Approved State Highway Engineer

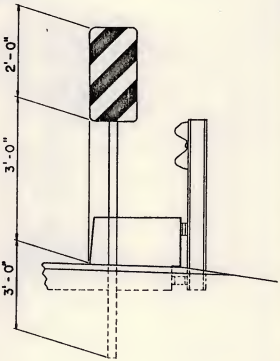
12" X 24"

12" X 36"

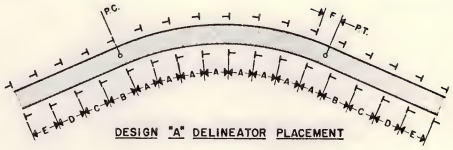


NOTE:
STRIPES SHALL BE BLACK AND REFLECTORIZED WHITE.
PANELS SHALL BE MOUNTED ON GAVANIZED STEEL 'U' POSTS 2 LBS./FT.
WITH INSIDE EDGE FLUSH WITH FACE OF CURB.

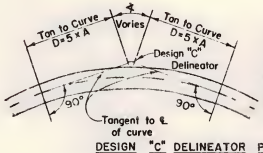




Drawn 5-1-65	REVISED 11-1-68 11-1-69 EFFECTIVE 1-1-69 1-1-70	STANDARD DRAWING NO. 88-92.15
State Highway Commission Helena, Montana	DELINEATOR SPACING FOR HORIZONTAL HIGHWAY CURVES	Approved Louis W. Skillings 12-15-67 State Highway Engineer



DESIGN "A" DELINEATOR PLACEMENT



Place Design "C" Delineators on curves sharper than 7° 30'. Position delineator faces perpendicular to tangent to center line of curve as shown. Spacing shall be as called for in Table below.

DESIGN "C" DELINEATOR PLACEMENT

HORIZONTAL CURVE SPACING TABLE

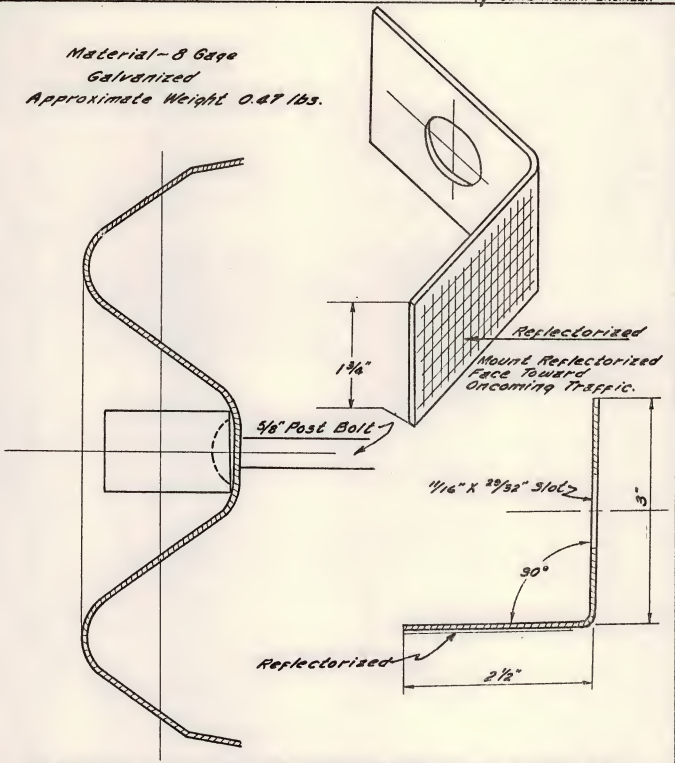
DEGREE OF CURVE	SPACING "A" ON CURVE	SPACING ON BOTH APPROACHES B	C	D	E
0° TO 30'	200'	264'	264'	264'	264'
30'+TO 1°	175'	264'	264'	264'	264'
1°+TO 2°	125'	225'	264'	264'	264'
2°+TO 3°	95'	170'	264'	264'	264'
3°+TO 4°	80'	145'	240'	264'	264'
4°+TO 6°	70'	125'	210'	264'	264'
6°+TO 8°	55'	100'	165'	264'	264'
8°+TO 12°	45'	80'	135'	264'	264'
12°+TO 20°	35'	65'	115'	210'	264'
20° PLUS	25'	45'	75'	150'	264'

FIELD METHOD FOR DETERMINING DEGREE OF HORIZONTAL CURVES

NOTES:

1. If distance F is 20 feet or more, add one regular "A" space as called for in the above table.
2. See Standard Drawing No. 88-91 for Delineator Design Details.
3. Post with delineators shall be placed on the right hand side facing oncoming traffic, 2'-0" clear from edge of shoulder or the face of curb, or as shown on the plans.
4. Delineator button shall be a nominal 3" diameter reflector as specified by Standard Specifications.
5. Delineator spacing on Tangent, shall be 264', unless otherwise noted on project plans.
6. Interstate highways shall be continuously delineated.
7. Posts shall be installed behind guard rail posts where there is guard rail installed along the highway.
8. Where, under normal spacing, a delineator post falls within a crossroad, that post may be moved in either direction a distance not to exceed one quarter of the normal spacing.
9. Primary & secondary highways may be continuously delineated in areas where ground blizzards are prevalent or in areas of hazardous alignment; otherwise, curves of 4° and sharper shall be delineated on the outside of the curve. Where vertical alignment is rolling, horizontal curves less than 4° may require delineation.

DRAWN 9-5-69	REVISED EFFECTIVE 1-1-70		STANDARD DRAWING 90-17
STATE HIGHWAY COMMISSION HELENA, MONTANA		REFLECTOR - WASHER	APPROVED James W. Walker 9/5/69 STATE HIGHWAY ENGINEER

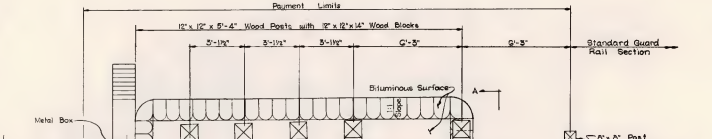


All sections of guard rail shall have reflector-washers installed every 25 ft. except for the turned down anchor and departure sections. Reflector-washers are not required on bridge end, bridge pier or grade crossing protection guard rail.

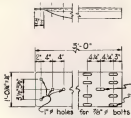
The use of reflectors will replace the need for the rectangular washers required to fasten rail to post.

Reflector-washers to be included in the unit price per linear foot of guard rail.

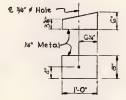
DRAWN	7-1-63	REVISED			STANDARD DRAWING NO.	90-15
EFFECTIVE	7-1-63	EFFECTIVE				
STATE HIGHWAY COMMISSION Helena, Montana			FLEX BEAM GUARD RAIL BRIDGE APPROACH		APPROVED	



PLAN

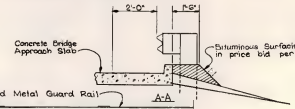


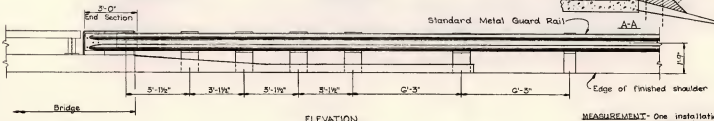
END SECTION DETAIL
(Scale: 1"= 1'-0")



METAL BOX
(Scale: 1"= 1'-0")

Note: This standard drawing is to be used for bridge approach ends with the standard flex beam guard rail.





ELEVATION

TYPICAL LAYOUT
(Scale: ⅛"=1'-0")

MEASUREMENT- One installation complete as detailed, to be measured as one unit. Normal installation for one structure = 4 units.

PAYMENT- Per each unit as contained in bid proposal.

REVISED	5-1-64	11-1-68	9-17-69
EFFECTIVE	5-1-64	1-1-69	1-1-70

STANDARD DRAWING NO. 96-01

State Highway Commission
Helena, Montana

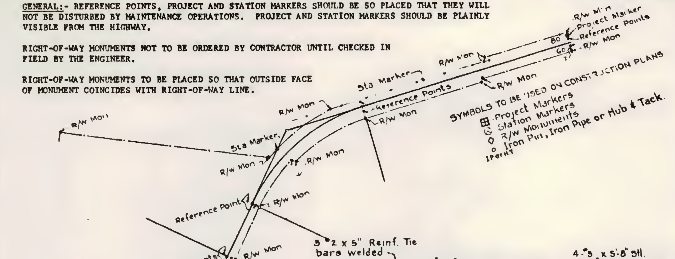
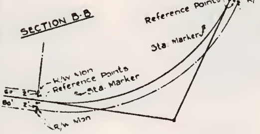
MONUMENTS & MARKERS

Approved
[signature] 10-24-68
State Highway Engineer

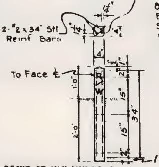
GENERAL:- REFERENCE POINTS, PROJECT AND STATION MARKERS SHOULD BE SO PLACED THAT THEY WILL NOT BE DISTURBED BY MAINTENANCE OPERATIONS. PROJECT AND STATION MARKERS SHOULD BE PLAINLY VISIBLE FROM THE HIGHWAY.

RIGHT-OF-WAY MONUMENTS NOT TO BE ORDERED BY CONTRACTOR UNTIL CHECKED IN FIELD BY THE ENGINEER.

RIGHT-OF-WAY MONUMENTS TO BE PLACED SO THAT OUTSIDE FACE OF MONUMENT COINCIDES WITH RIGHT-OF-WAY LINE.

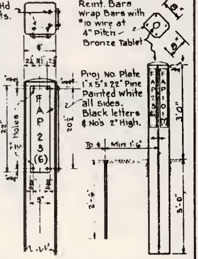



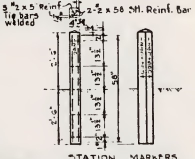
RIGHT-OF-WAY MONUMENTS WILL BE SET AT ALL POINTS WHERE THE WIDTH OF THE RIGHT-OF-WAY CHANGES, AND AT ANGLE POINTS, THE P.C. AND P.T. OF SIMPLE CURVES, AND THE T.S. AND S.T. OF SPIRAL CURVES. WHEN IT SEEMS UNDESIRABLE TO USE THE CONCRETE MONUMENTS, AS ON LOT OR BLOCK LINES IN SOME PARTS OF A TOWN, CONCRETE MONUMENTS WILL BE OMITTED AND IRON PIPES OR PINS WILL BE PLACED BY STATE HIGHWAY COMMISSION FORCES.



RIGHT-OF-WAY MONUMENT

CONCRETE:
RUBBED FINISH ON FACE. 4"X4" SQUARE.
RECESSED LETTERS 3" HIGH;
CORNERS CHAMFERED 1/2".





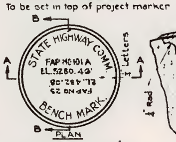
STATION MARKERS

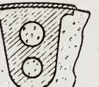
STATION MARKERS ARE TO BE SET OPPOSITE EVERY TENTH STATION AND AT IMPORTANT EQUATIONS. EQUATIONS OF LESS THAN 100' MAY BE DISREGARDED. MARKERS ARE TO BE SET ON THE NORTH OR WEST SIDE OF THE CENTERLINE DEPENDING ON THE GENERAL DIRECTION OF THE ROUTE OR SHALL BE SET SO AS TO BE VISIBLE FROM THE HIGHWAY CENTERLINE (ON R/W LINE IF POSSIBLE).

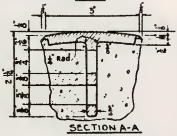
CONCRETE:
RUBBED FINISH ON FACE.
RECESSED LETTERS 3" HIGH EXCEPT EQUATIONS WHICH WILL BE 1 1/2" HIGH.
CORNERS CHAMFERED 1/2".

BRONZE TABLET

To be set in top of project marker







BRONZE TABLET

EXPOSED SURFACES OF THE TABLET ARE TO BE GROUND SMOOTH. LETTERS ARE TO BE RECESSED 1/16". INFORMATION ON THE TABLET, INDICATED BY PIN LINES, IS TO BE STAMPED IN THE FIELD BY THE ENGINEERING PARTY AFTER POST IS PLACED, USING 3/16" LETTERS.

PROJECT MARKER POSTS TO BE REINFORCED CONCRETE. CORNERS CHAMFERED 1/2". PROJECT NUMBER PLATE TO BE FURNISHED AND ERECTED BY STATE FORCES. SERIES "D" LETTERS AND NUMERALS TO BE USED AS PER STANDARD ALPHABETS PUBLISHED BY BUREAU OF PUBLIC ROADS, 1945.

REFERENCE POINT

1" IRON PIN.
ANOTHER REFERENCE POINT TO BE SET ON OPPOSITE SIDE OF HIGHWAY.

PROJECT MARKERS ARE TO BE SET AT THE BEGINNING AND END OF ALL PROJECTS ON EITHER SIDE OF THE HIGHWAY.

REFERENCE POINTS ARE TO BE SET ON BOTH SIDES OF THE CENTERLINE AT THE BEGINNING AND END OF ALL PROJECTS, AT ALL PCs, PTs AND ANGLE POINTS AND AT SUCH HIGH POINTS ON LONG TANGENTS AS MAY BE DESIRABLE. EXCEPT AT PROJECT MARKERS, THEY ARE TO BE AT ANY CONVENIENT DISTANCE FROM THE CENTERLINE.

ALL CONCRETE SHALL BE CLASS "DD" OR EQUAL.

STATE HIGHWAY COMMISSION
HELENA, MONTANA 59601

APRIL 1, 1970

STANDARD DRAWING BOOK

We are sending the following additions and/or revisions effective April 1, 1970, to be included in your present Standard Drawing Book, the grey covered one, original issue January 1, 1969.

11-04	Roadway Embankment at Bridge Ends
39-14(A)	Standard Concrete Approach Slab to Structures
39-14(B)	Standard Concrete Approach Slab to Structures
39-15(A)	Standard Concrete Approach Slabs to Structures with U-Type Abutments
39-15(B)	Standard Concrete Approach Slabs to Structures with U-Type Abutments
50-05	Concrete Drainage Chute
51-03	Backfill Retainer and Cutoff Wall for Vehicular Underpass
54-03	Bedding Material
59-04	Vehicular Underpass
73-09	Concrete Edge Protection for Concrete Pipe Culverts
73-10	Concrete Edge Protection for Concrete Arch Culverts
77-06	Curb Inlet Box and Cover
90-18	Flex Beam Guard Rail Bridge Approach

NOTE: (1) Add these drawings to your book.
(2) We are also sending a complete new index, pages 1 through 6. You should destroy the old index, pages 1 through 6.
(3) Also note several drawings have been deleted as of April 1, 1970.

Melvin C. Rygg

Melvin C. Rygg, P. E.
Office Engineer

STATE HIGHWAY COMMISSION
HELENA, MONTANA 59601

Jan. 1, 1969

STANDARD DRAWINGS FOR HIGHWAY CONSTRUCTION REV. April 1, 1970

These Standard Drawings which are supplementary to the Standard Specifications become effective January 1, 1969.

In the future when revised drawings are sent, they will become effective on the date shown thereon and the superseded drawings should be retained until no longer applicable.

New drawings issued will become effective on the date shown thereon.

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39-15(B)	Standard Concrete Approach Slabs to Structures with U-Type Abutments - Added Effective April 1, 1970
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54-03	Bedding Material
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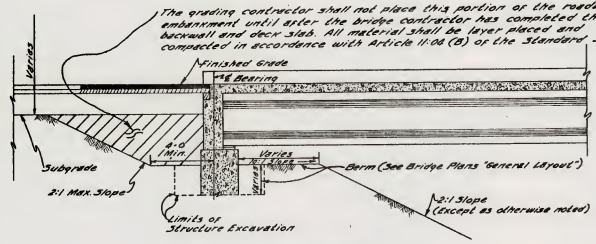
REVISED	4-16-69	6-1-69	9-23-69	1-29-70	STANDARD DRAWING NO. 11-04
EFFECTIVE	6-1-69	7-1-69	1-1-70	4-1-70	

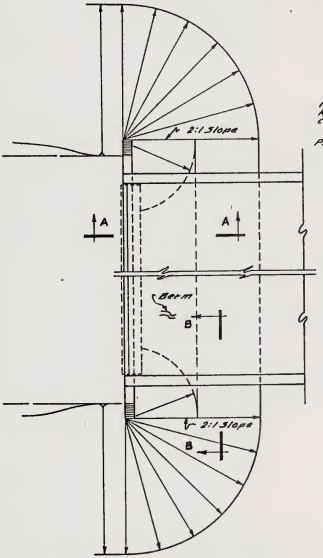
State Highway Commission
Helena, Montana

ROADWAY EMBANKMENT AT BRIDGE END

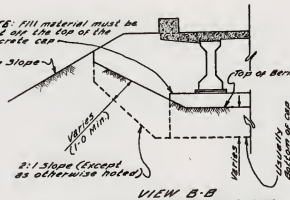
Approved
Louis G. Pitsky 8/31/70
State Highway Engineer



SECTION A-A



PLAN VIEW AT FINISHED BRIDGE END



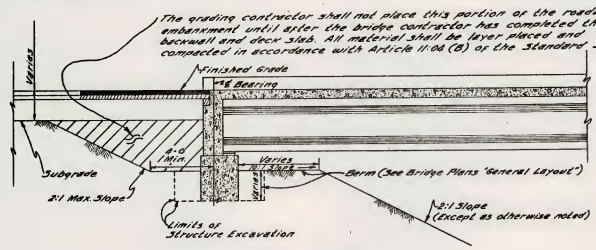
VIEW B-B
AT FINISHED BRIDGE END

REVISED	4-16-69	6-1-69	9-23-69	1-29-70	STANDARD DRAWING NO. 11-04
EFFECTIVE	6-1-69	7-1-69	1-1-70	4-1-70	

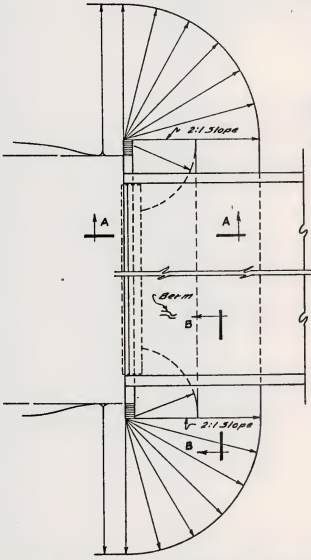
State Highway Commission
Helena, Montana

ROADWAY EMBANKMENT AT BRIDGE END

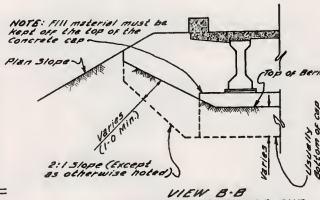
Approved
Louis A. Pichay 8/31/69
State Highway Engineer



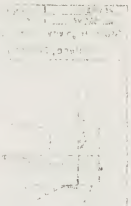
SECTION A-A



PLAN VIEW AT FINISHED BRIDGE END



VIEW B-B
AT FINISHED BRIDGE END



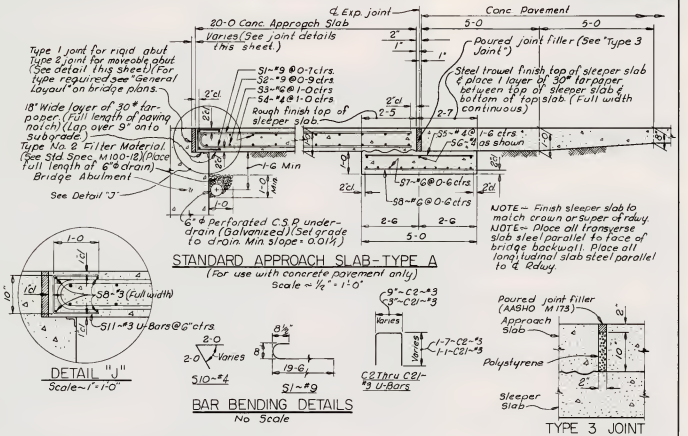
REVISED	5-70
EFFECTIVE	4-1-70

STANDARD DRAWING NO. 39-14 (A)

STATE HIGHWAY COMMISSION
HELENA, MONTANA

STANDARD CONCRETE APPROACH SLAB TO STRUCTURES

Approved by:
STATE HIGHWAY ENGINEER



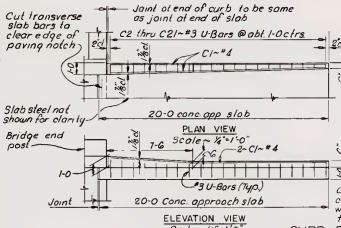
STANDARD APPROACH SLAB - TYPE A

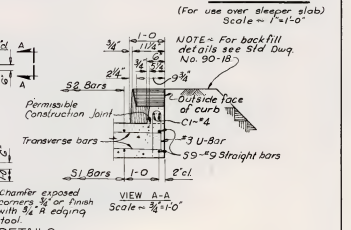
(For use with concrete pavement only)
Scale = 1/2" = 1'-0"

DETAIL "J"
Scale - 1" = 1'-0"

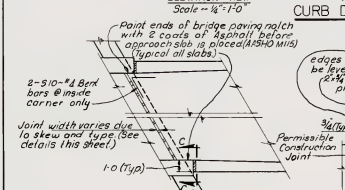
BAR BENDING DETAILS
No Scale

TYPE 3 JOINT
(For use over sleeper slab)
Scale = 1" = 1'-0"

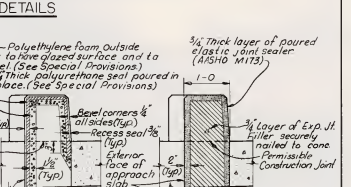




CURB DETAILS



CURB END DETAILS AT SKEWED BRIDGE
Scale = 1/2" = 1'-0"



SECTION C-C
Scale = 1" = 1'-0"

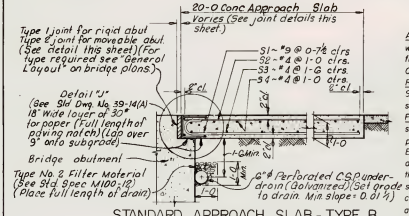
REVISED	5-6-70
EFFECTIVE	4-1-70

STANDARD DRAWING NO. 39-14 (B)

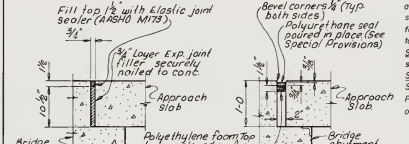
STATE HIGHWAY COMMISSION
HELENA, MONTANA

STANDARD CONCRETE APPROACH SLAB TO STRUCTURES

Approved by
Leon W. Kelly 4/1/70
STATE HIGHWAY ENGINEER

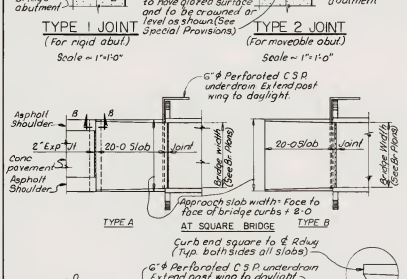


STANDARD APPROACH SLAB - TYPE B
(For use with asphalt pavement only)
Scale ~ ½" = 1'-0"



TYPE 1 JOINT
(For rigid abut.)
Scale ~ 1"=1'-0"

TYPE 2 JOINT
(For moveable abut.)
Scale ~ 1" = 1'-0"



PLAN VIEW OF APPROACH SLABS
No Scale

Note ~ Slab & curb shall be curved or tapered when necessary to match roadway.

NOTES

APPROACH SLAB Approach slab shall be constructed in accordance with Section 41 of the Standard Specification The slab shall be finished as specified for bridge decks in Article 41.04(K) 2 & 3. Concrete shall be either Class "AD" or Class "AP" at contractors option

REINFORCING STEEL Reinforcing steel shall be in accordance with Section 47 of the Standard Specifications except method of measurement and payment shall be as set forth below.

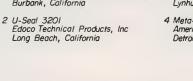
FOUNDATION The foundation for the approach slab and sleeper slab shall consist of the subgrade and base constructed and compacted in accordance with Standard Plans and Specifications. Excavation for sleeper slab shall be held to a minimum and all area excavated but not filled with concrete shall be backfilled with the same material that was taken from the excavation All backfill shall be layer placed and compacted with mechanical tampers. The cost of all excavation necessary for the placement of approach slab and sleeper slab shall be included in the unit price bid for "Concrete Approach Slab" as set forth below.

MEASUREMENT & PAYMENT Approach slabs shall be measured by area in square yards The width and length for measurement shall be from out to out of completed slab. No additional area will be allowed for the sleeper The unit price bid per square yard for "Concrete Approach Slab" shall be full compensation for furnishing all materials, equipment, tools and labor necessary to complete the work, including the sleeper slab

SEALS For type and method of application of polyurethane seals see Special Provisions

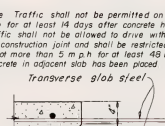
SEALANT Polyurethane sealants shall meet Federal Specification SS-S-00950-(NCE) Sealing Compound Two-component Elastomeric Polymer Type, Cold-Applied, Concrete Paving Joints and shall be one of the following or approved equal

1. PRC 3105 Products Research and Chemical Corp Burbank, California
2. U-Seal 3201 Edoco Technical Products, Inc Long Beach, California
3. Sikaflex T-68 Sika Chemical Corp Lynhurst, New Jersey
4. Meta-Seal 220 American Metaseal Co. Detroit, Michigan



SECTION B-B

Note Traffic shall not be permitted on new approach slab for at least 14 days after concrete has been placed. Traffic shall not be allowed to drive within 5 feet of the construction joint and shall be restricted to a speed of not more than 5 m.p.h. for at least 48 hours after the concrete in adjacent slab has been placed



LONGITUDINAL CONSTRUCTION JOINT DETAIL
Scale ~ 1½" = 1'-0"
(Use only when shown on the plans or approved by the engineer.)

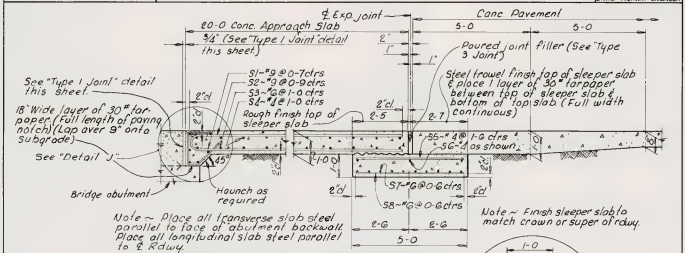
REVISED	5-6-70
EFFECTIVE	6-1-70

STANDARD DRAWING NO 39-15(A)

STATE HIGHWAY COMMISSION
HELENA, MONTANA

STANDARD CONCRETE APPROACH SLABS TO STRUCTURES WITH U-TYPE ABUTMENTS

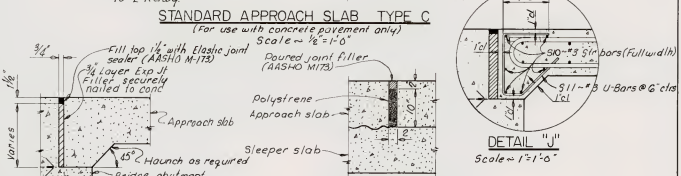
Approved by [signature] 6/1/70
STATE HIGHWAY ENGINEER



STANDARD APPROACH SLAB TYPE C

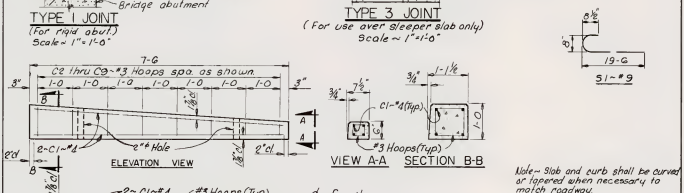
(For use with concrete pavement only)

Scale ~ ½" = 1'-0"

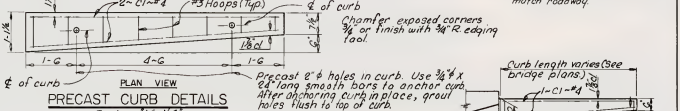


TYPE 1 JOINT
(For rigid abut.)
Scale ~ 1" = 1'-0"

TYPE 3 JOINT
(For use over sleeper slab only)
Scale ~ 1" = 1'-0"

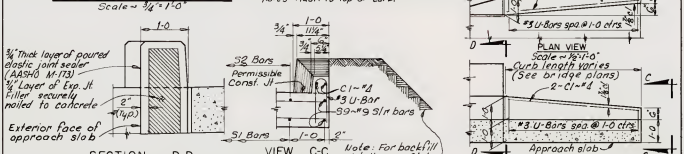


Note ~ Slab and curb shall be curved or tapered when necessary to match roadway.



PRECAST CURB DETAILS

Scale ~ ¾" = 1'-0"



CAST IN PLACE CURB DETAILS

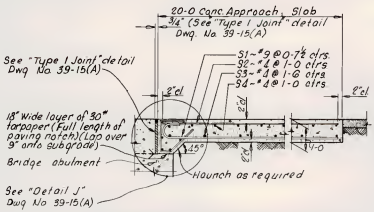
REVISED	3-6-70
EFFECTIVE	4-1-70

STATE HIGHWAY COMMISSION
HELENA, MONTANA

STANDARD CONCRETE APPROACH SLABS TO STRUCTURES WITH U-TYPE ABUTMENTS

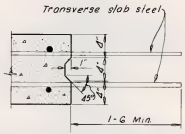
STANDARD DRAWING NO. 39-15 (B)

Approved by [signature] 4/1/70
STATE HIGHWAY ENGINEER



STANDARD APPROACH SLAB - TYPE D

(For use with asphalt pavement only)
Scale ~ ½" = 1'-0"



LONGITUDINAL CONSTRUCTION JOINT DETAIL

Scale ~ 1½" = 1'-0
(Use only when shown on the plans or approved by the engineer.)

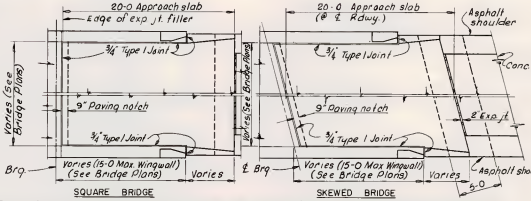
APPROACH SLAB Approach slab shall be constructed in accordance with Section 41 of the Standard Specifications. The slab shall be finished as specified for bridge decks in Article 4(.04(K)2 & 3. of the Standard Specifications. Concrete shall be either Class AD or Class AP at contractor's option.

REINFORCING STEEL Reinforcing steel shall be in accordance with Section 47 of the Standard Specifications except method of measurement and payment shall be as set forth below.

FOUNDATION The foundation for the approach slab and sleeper slab shall consist of the subgrade and base constructed and compacted in accordance with the Standard Specifications. Excavation for sleeper slab shall be held to a minimum and all area excavated but not filled with concrete shall be backfilled with the same material that was taken from the excavation. All backfill shall be layer placed and compacted with mechanical tampers. The cost of all excavation necessary for the placement of approach slab and sleeper slab shall be included in the unit price bid for "Concrete Approach Slab" as set forth below.

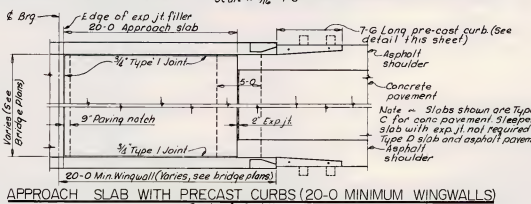
MEASUREMENT & PAYMENT Approach slabs shall be measured by area in square yards. The width and length for measurement shall be from out to out of completed slab. No additional area will be allowed for the sleeper slab. The unit price bid per square yard for "Concrete Approach Slab" shall be full compensation for furnishing all materials, equipment, tools and labor necessary to complete the work, including the sleeper slab.

Note: Traffic shall not be permitted on new approach slab for at least 14 days after concrete has been placed. Traffic shall not be allowed to drive within 5 feet of the construction joint and shall be restricted to a speed of not more than 5 m.p.h. for at least 48 hours after the concrete in adjacent slab has been placed.



APPROACH SLAB WITH CAST IN PLACE CURB (15-0 MAXIMUM WINGWALLS)

Scale ~ 3/16" = 1'-0"



APPROACH SLAB WITH PRECAST CURBS (20-0 MINIMUM WINGWALLS)

Scale ~ 3/16" = 1'-0"

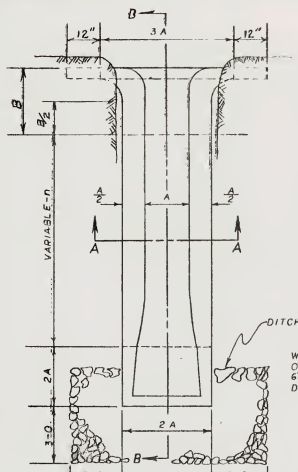
Revised	6-1-69	2-6-70
Effective	7-1-69	4-1-70

STANDARD DRAWING NO. 50-05

STATE HIGHWAY COMMISSION
HELENA, MONTANA

CONCRETE DRAINAGE CHUTE

Approved: Director 5/14/69
State Highway Engineer



NOTES

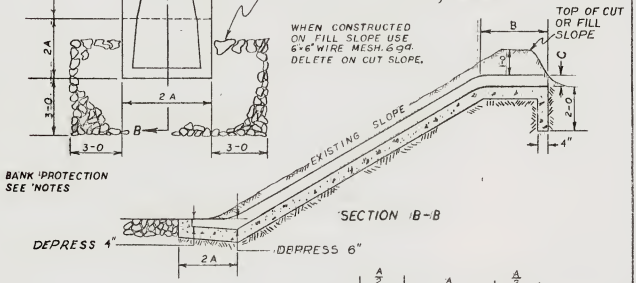
SPECIFICATIONS: Montana State Highway Commission Standard Specifications for Road and Bridge Construction, adopted March 1,1968 and any amendments thereto, and special provisions shall govern unless otherwise noted.

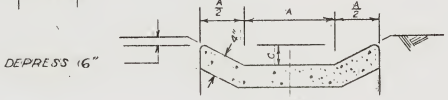
CONCRETE: All concrete shall be class AC-DC unless otherwise noted. Concrete shall conform to section 40 of the specifications. Concrete may be pneumatically applied.

*BANK PROTECTION: Bank protection shall be type 4 and shall conform to subsection 30.30 of the specifications. Thickness shall be 12".

INLET CONDITIONS: The inlet is to be depressed below the natural drainage basin to prevent flow from side channeling over the slope before reaching the chute.

WHEN CONSTRUCTED ON FILL SLOPE USE 6"x6" WIRE MESH, 6 ga. DELETE ON CUT SLOPE.





DIMENSIONS			QUANTITIES
A	B	C	CONCRETE CU.YD.
2-0	4-0	0-4	0.7 cu.yd. + n x .051 cu.yd./lin.ft.
2-0	4-0	1-0	0.9 cu.yd. + n x .056 cu.yd./lin.ft.
4-0	8-0	1-0	2.2 cu.yd. + n x .105 cu.yd./lin.ft.
4-0	8-0	1-6	2.3 cu.yd. + n x .111 cu.yd./lin.ft.

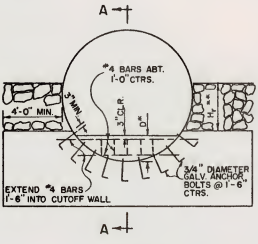
*Excavation and bank protection to be included in the unit price *bid for concrete

REVISED	5-1-65	11-20-68	2-20-70		STANDARD DRAWING NO. 51 03
REVISED	5-1-65	1-1-69	5-1-76		

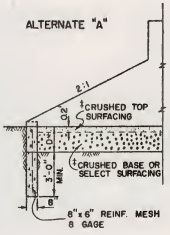
State Highway Commission
Helena, Montana

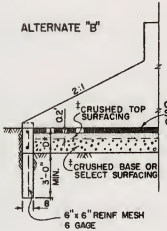
BACKFILL RETAINER & CUTOFF WALL FOR VEHICULAR UNDERPASS

Approved
State Highway Engineer



ELEVATION





SECTION A-A

¶ SEE STD. DWG. NO. 59-06
¶¶ H_r = HEIGHT OF RIPRAP (SEE ROAD PLAN)
‡ ON THE DESIGN 102, THE BACKFILL MATERIAL SHALL BE CRUSHED TOP SURFACING ONLY.

DIAMETER (Inches)	CONCRETE QUANTITIES (CU. YDS.)		
	BACKFILL RETAINER	CUTOFF WALL	TOTAL CONCRETE
102	0.1	1.7	1.8
126	0.2	2.0	2.2
162	0.4	2.8	3.2
180	0.4	3.1	3.5
198	0.6	3.5	4.1
210	0.3	3.3	3.6

NOTE: CONCRETE SHALL BE CLASS "DD" OR EQUAL.
CONCRETE QUANTITIES ARE FOR ONE END ONLY.
REINFORCING MATERIAL TO BE INCLUDED IN UNIT PRICE BID PER CU YD. CONC.
ANCHOR BOLTS TO BE INCLUDED IN THE UNIT PRICE BID PER LIN. FT. PIPE.

SURFACING QUANTITIES PER LINEAL FOOT

DIAMETER (Inches)	ALTERNATE "A"		ALTERNATE "B"						
	CUBIC YARDS		TON		CUBIC YARD		TONS	BITUM. MAT'L.	
	TOP SURF.	CR. BASE OR SEL. SURF.	COVER MAT'L.	PLANT MIX	TOP SURF.	CR. BASE OR SEL. SURF.	PRIME	PLANT MIX	SEAL
102	0.100	—	—	—	—	—	—	—	—
126	0.047	0.156	0.0093	0.096	0.045	0.111	0.0009	0.0062	0.0009
162	0.073	0.489	0.0139	0.146	0.069	0.408	0.0014	0.0095	0.0014
180	0.073	0.446	0.0142	0.148	0.071	0.375	0.0014	0.0096	0.0014
198	0.088	0.712	0.0167	0.176	0.084	0.627	0.0017	0.0114	0.0017
210	0.074	0.333	0.0140	0.141	0.067	0.267	0.0014	0.0092	0.0014

REVISED	1-1-68	11-20-68	7-15-69	3-24-70
REVISED	2-1-68	1-1-69	1-1-70	4-1-70

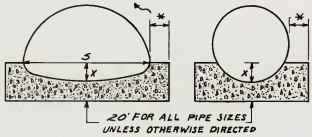
STANDARD DRAWING NO. 54-03

State Highway Commission
Helena, Montana

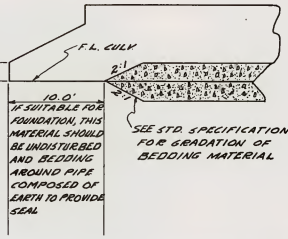
BEDDING MATERIAL

Approved
Leonard Butler
State Highway Engineer

*AS DIRECTED WITHIN 2.0' TO 6.0' FOR PIPES GREATER THAN 60" DIAMETER OR SPAN. 2.0' FOR SMALLER PIPES.



FOR X DIST SEE STD. DRAWINGS NOS. 53-01 53-03 53-04 & 53-05



CIRCULAR C.S.P.& S.S.P.P.C.

DIAMETER OF PIPE (IN)	CU YDS. BEDDING MAT'L REQ'D PER LIN. FT. FOR 20' THICKNESS	DIAMETER OF PIPE (IN)	CU YDS. BEDDING MAT'L. REQ'D PER LIN. FT. FOR 20' THICKNESS
60	0.92	162	2.45
66	1.02	168	2.55
72	1.09	174	2.66
78	1.15	180	2.70
84	1.25	192	2.89
90	1.33	198	3.10
96	1.41	204	3.22
102	1.50	210	3.34
108	1.58	216	3.45
114	1.67	228	3.69
120	1.76	240	3.94
126	1.85	252	4.20
132	1.93		
138	2.02		
144	2.14		
150	2.28		
156	2.38		

STRUCT. PLATE PIPE ARCH STOCK & VEHICULAR UNDERPASS

SPAN	RISE	CU YDS. BEDDING MAT'L REQ'D PER L.F. (2' THICK)
12-2	11-0	2.03
13-10	12-2	2.25
14-10	14-0	2.37
15-8	15-0	2.40
16-5	16-0	2.49
17-3	17-0	2.76
19-1	17-2	3.09
20-4	17-9	3.21

STRUCTURAL PLATE PIPE ARCH

SPAN	RISE	CU. YDS. BEDDING MAT'L. REQ'D PER LIN. FT. FOR 2.0' THICKNESS		
		1½:1 BEV.	2:1 BEV.	2½:1 BEV.
12" CORNER PLATES				
6'1"	4'7"	1.16	1.16	1.16
6'3"	4'11"	1.23	1.23	1.23
7'3	5'3	1.19	1.19	1.19
7'11	5'7	1.30	1.30	1.30
8'7	5'11"	1.37	1.37	1.37
9'4"	6'3	1.47	1.47	1.47
9'9	6'7	1.44	1.46	1.48
10'8"	6'11"	1.68	1.68	1.68
11'5"	7'3"	1.76	1.76	1.76
11'10"	7'7"	1.68	1.68	1.68
12'6	7'11	1.80	1.80	1.80
12'10	8'4"	1.75	1.75	1.75
31" CORNER PLATES				
14'0	9'8"	2.13	2.13	2.13
15'4	10'4	2.31	2.31	2.31
16'6	11'0"	2.36	2.36	2.36
17'11	11'8"	2.58	2.58	2.58
19'3"	12'4	2.77	2.77	2.77
20'5	13'0	2.91	2.21	2.91

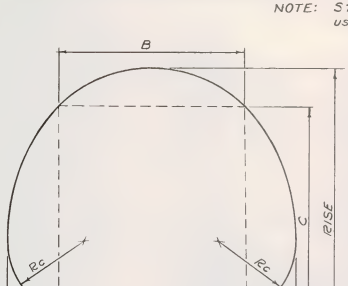
STRUCT. PLATE PIPE STOCK PASS

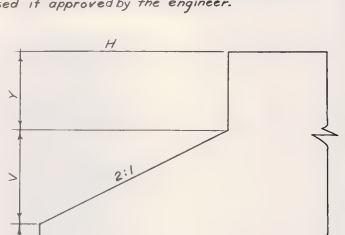
DESIGN	SPAN	RISE	CU YDS. BEDDING MAT'L REQ'D PER L.F. (2" THICK)
A	5'-10"	6'-6"	0.99
B	5'-10"	7'-7"	0.99

REVISED EFFECTIVE 4-1-70	STANDARD DRAWING NO. 59-04
STATE HIGHWAY COMMISSION HELENA, MONTANA	VEHICULAR UNDERPASS

Approved: Lewis W. Gallagher 8/21/70 State Highway Engineer

NOTE: Structures of a similar design may be used if approved by the engineer.





NOTE: Height of cover shall not be less than 5.0 feet.

SPAN (ft-in)	RISE (ft-in)	A (ft)	B (ft)	C (ft)	H (ft)	V (ft)	X (ft-in)	Y (ft-in.)
12-2	11-0	10	8	8	10	5	3-8.4	2-3.6
13-10	12-2	10	8	10	10	5	3-10	3-4
14-10	14-0	12	10	10.5	10	5	3-10.4	5-1.6
15-8	15-0	12	10	12	10	5	3-11	6-1
16-5	16-0	12	10	13	12	6	3-7.5	6-4.5
17-3	17-0	12	10	14	12	6	4-8.7	6-3.3
19-1	17-2	16	12	13	12	6	4-9.6	6-4.4
20-4	17-9	16	12	14	12	6	4-9.3	6-11.7

SPAN (ft-in)	RISE (ft-in)	RADIUS Rc (in)	MAXIMUM HEIGHT OF COVER IN FEET					
			10 GAGE	8 GAGE	7 GAGE	5 GAGE	3 GAGE	1 GAGE
12-2	11-0	38	17	19	20	22	25	27
13-10	12-2	38	15	17	18	20	21	23
14-10	14-0	38	14	15	16	18	20	22
15-8	15-0	38	13	14	15	17	19	21
16-5	16-0	38	12	12	13	14	15	16
17-3	17-0	47	11	12	12	13	14	15
19-1	17-2	47	10	10	11	12	13	14
20-4	17-9	47	9	10	10	11	12	13

NOTE: These structures will be designated, in plans and proposal, as "Vehicular Underpass". Materials, installation and other provisions shall conform to the standard specifications.
The term "Vehicular Underpass" will be used, regardless of the use or purpose of the structure.

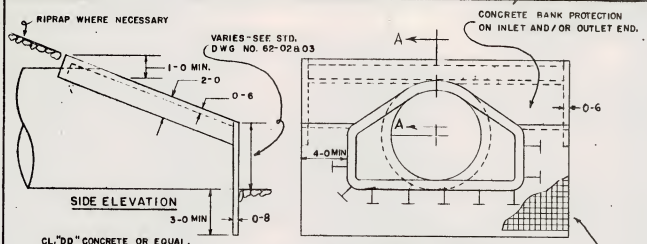
REVISED	- - -
EFFECTIVE	4-1-70

STANDARD DRAWING NO. 73-09

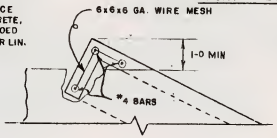
STATE HIGHWAY COMMISSION
HELENA, MONTANA

CONCRETE EDGE PROTECTION FOR CONCRETE PIPE CULVERTS

APPROVED
Travis Kelly 2-25-70
STATE HIGHWAY ENGINEER



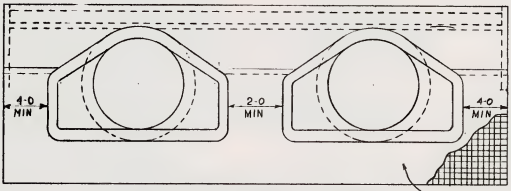
CL. "DD" CONCRETE OR EQUAL, REINFORCING MAT'L. TO BE INCLUDED IN THE UNIT PRICE BID PER CU. YDS. OF CONCRETE. ANCHOR BOLTS TO BE INCLUDED IN THE UNIT PRICE BID PER LIN. FT. OF PIPE CULVERT.



SECTION A A

3/4"ø ANCHOR BOLTS @ ABT. 18" CENTERS AROUND ENTIRE PERIPHERY OF PIPE EMBEDDED IN CONCRETE (TYP. ALL STRUCTURES THIS SHEET), SEE STD. DWG. 73-05.

6x6x6 GAGE WIRE MESH REINFORCING THRUOUT ENTIRE STRUCTURE

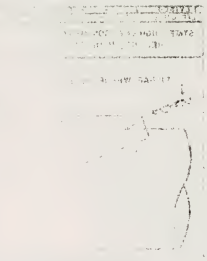


FRONT ELEVATION MULTIPLE PIPES

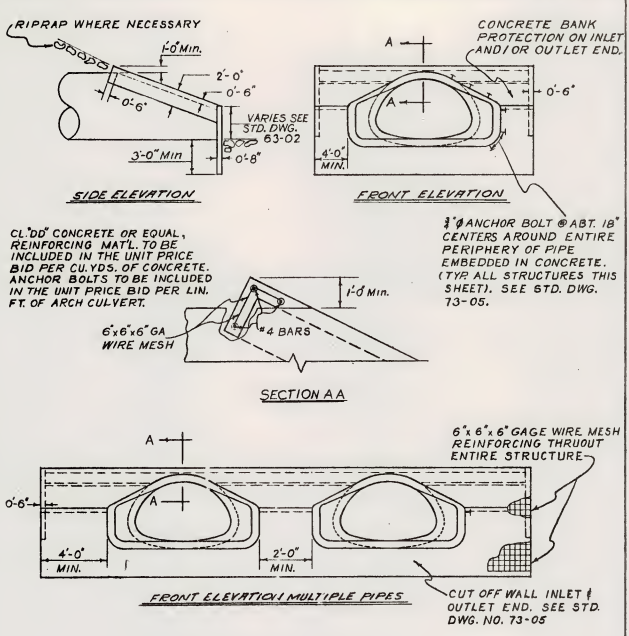
CUT OFF WALL INLET & OUTLET END. SEE STD. DWG. NO. 73-05

Size	Single Pipe			Dual Pipe		
	sq. ft. wire reinforcing mesh	ft. no. 4 bar	cu. yds. concrete	sq. ft. wire reinforcing mesh	ft. no. 4 bar	cu. yds. concrete
48"	258	47.5	5.2	368	75.5	7.4
54"	241	49.3	4.9	343	79.0	7.0
60"	227	50.5	4.7	319	81.5	6.6
72"	256	54.0	5.2	369	88.5	7.6
84"	277	57.2	5.7	403	95.0	8.3

FOR ESTIMATING PURPOSES ONLY



REVISED EFFECTIVE 4-1-70.		STANDARD DRAWING NO. 73-10
State Highway Commission Helena, Montana	CONCRETE EDGE PROTECTION FOR CONCRETE ARCH CULVERTS	Approved 3-11-70 State Highway Engineer

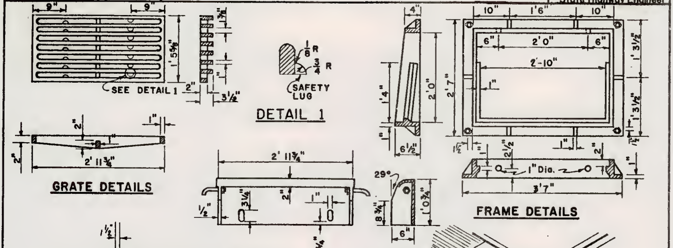


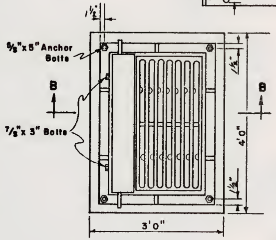
SIZE Inches	SINGLE			DUEL		
	Sq.ft. Wire Reinforcing Mesh	Feet No. 4 re-bar	Cu. yds. Concrete	Sq.ft. Wire Reinforcing Mesh	Feet No. 4 re-bar	Cu. yds. Concrete
48	223	47.5	4.5	331	77.0	6.7
54	232	49.3	4.7	346	80.5	7.1
60	242	51.0	5.0	362	84.0	7.4
72	249	57.5	5.1	382	97.0	7.9

* FOR ESTIMATING PURPOSES ONLY

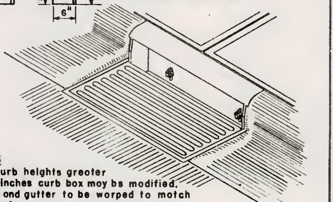
REVISED	3-20-67	11-20-68	2-3-70		STANDARD DRAWING NO. 77-06
EFFECTIVE	6-1-67	1-1-69	4-1-70		

State Highway Commission Helena, Montana	CURB INLET BOX AND COVER	Approved [signature] State Highway Engineer





PLAN



NOTES

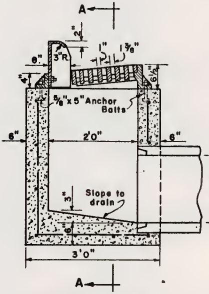
For curb heights greater than 8 inches curb box may be modified.

Curb and gutter to be warped to match drop inlet.

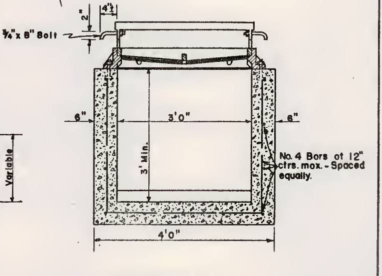
All concrete to be class "DD" OR EQUAL.

These details to serve as an example only. Designers will design to fit specific conditions. See plans for details and quantities. Use local standards where available.

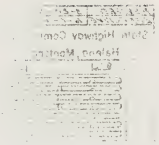
After placement of curb box, the adjustment slots may be filled to supply bearing to bolts so to carry wheel loads, or bolt holes may be drilled in curb box after grades are established.



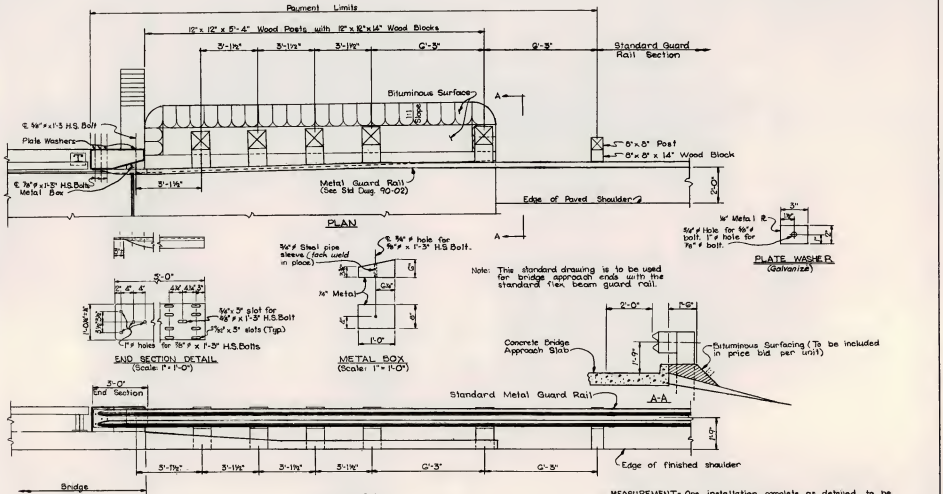
SECTION B-B



SECTION A-A



DRAWN	7-1-58 REVISED	4-1-70		STANDARD DRAWING NO. 90-15
TRACED	7-1-70 REVISED	4-1-78		
STATE HIGHWAY COMMISSION Helena, Montana			FLEX BEAM GUARD RAIL BRIDGE APPROACH	APPROVED: [illegible] STATE HIGHWAY ENGINEER



MEASUREMENT- One installation complete as detailed to be measured as one unit. Normal installation for one structure = 4 units.

PAYMENT- Per each unit as contained in bid proposal.